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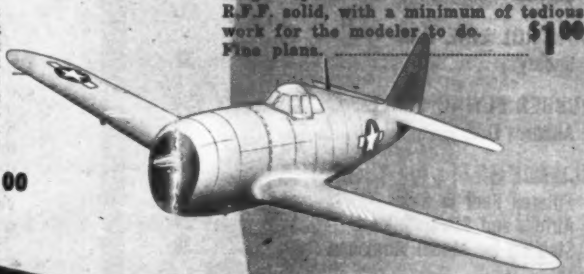

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FEBRUARY, 1945 VOL. XXXII, No. 2

CONTENTS

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OFF THE LINE

AN EDITOR, most particularly an aviation editor, often wonders whether he is anything more than a "father confessor" to a large section of his readers. His office is deluged with "what do you think of this idea?" letters crammed full of elaborate drawings, sketches and lengthy manuscripts outlining the merits and possibilities of some new "invention." Now an editor must always be receptive to new ideas, or so the instruction book says—therefore we cannot bluntly dismiss these many inventions, or ideas for inventions, because a rebuffed reader quickly becomes a reader no more.

And so we must give every consideration to these weighty tomes and answer same with lengthy letters of explanation pointing out., if possible, the exact location of the difficulties, and the mechanical principles involved which were overlooked.

Most of these "inventors" rest their case on a single thought: ". . . and the engineers can figure out the details." Here is an idea for a jet propelled helicopter, some sort of fuselage with two or three rotors above and a thermal jet engine with something like a garden hose for a nozzle which can be "squirted" in any given direction, thereby giving control in a full spherical 360°. We ask: "Where is your air intake, what type air compressor will you use, how will you operate this nozzle, what sort of coupling do you have on the rotors?" Such questions bother our "inventor" not at all: "Oh, I'll get some engineer to figure out all those details. I just have the ideas!"

An engineer is not a miracle man; he cannot invoke magic words and have details suddenly form on a piece of paper. The engineer is the least creative of any worker; his tools are the cold, hard rules of mathematics, the unbending truths of mechanics, the unwavering experience of manufacture and operation. He cannot "stretch" a column of figures or bend an unpliable principle.

Most, if not all, inventions have sprung from the hard, uncooperative facts of a disassociated problem. It is normally while working on the details of an old familiar problem that their application to a new device is suddenly recognized. The engineer works out the details first, then adapts his thoughts to the shape of a finished article.

Putting the cart before the horse is the failing of the neophyte. To lay great store in the magnificence of the end product with a bold disregard for "how" would embarrass the most inexperienced engineer. It is folly to attempt to substitute "vision" for skill and hard work.

In few industries are these thoughts more applicable than aviation design and manufacture. The amateur spends hours idly sketching beautiful exterior lines for airplanes: pushers, inverted gull wings, canards, flying wings, *ad infinitum*.

"Here is a super-hot job, much faster than a *Lightning* or a *Thunderbolt* . . . kindly publish this in your magazine," state letters accompanying such drawings. From the envelope drops a sketch of a monoplane with twin pusher propellers, retractable landing gear and a large assortment of machine-guns, cannon, bombs and rockets. On occasion the span of the plan will be given and we will begin to scale off some important dimensions. Here for instance is the fuselage, *(Continued on page 62)*


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DATE OF BIRTH N-2

MODEL AIRPLANE NEWS' Publisher George C. Johnson and Managing Editor Robert McLarren have just returned from a whirlwind tour of giant Pratt & Whitney's parent plant at East Hartford, Connecticut, and came away with a profound impression of quiet, relentless production in this heart of America's Air Power.

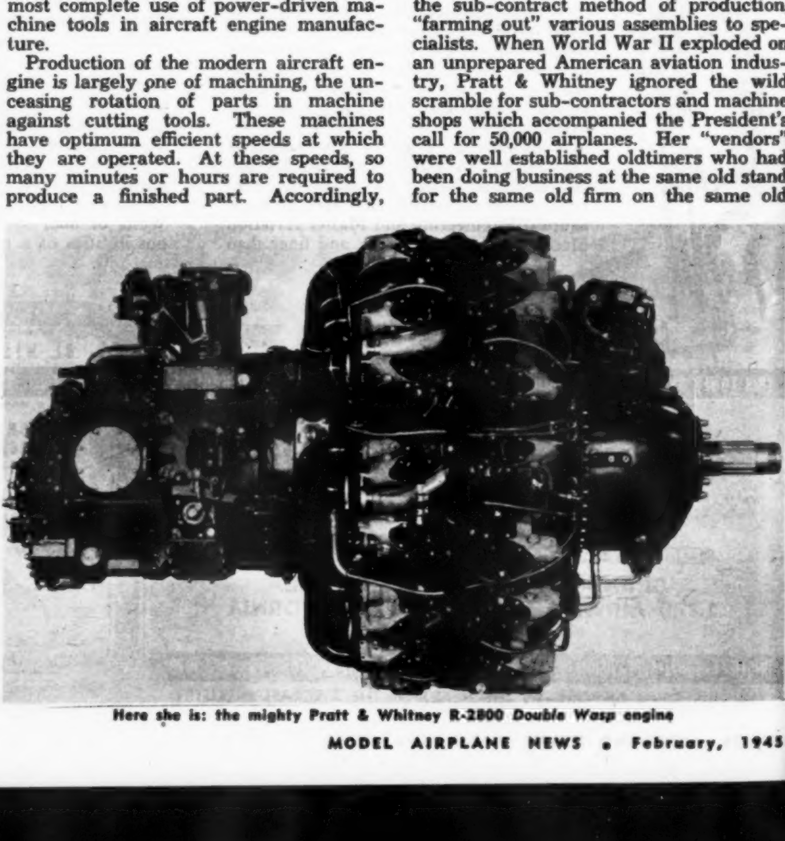
Scooting about in a special three-seat power driven observation car (with the operator in the rear) similar to the famous World's Fair and Atlantic City Boardwalk perambulators, we were amazed to find ourselves carrying on normal conversation amidst high speed production machinery and assembly operations of the most powerful engines in the world. This was the greatest single impression we gained: the almost complete lack of noise at Pratt & Whitney's huge factory. Thoroughly acquainted with the raucous, almost frantic bedlam of the aircraft factory, we were prepared to miss 90% of the "lecture" given by our personal guide, a usual failing in aircraft plants.

But with tens of millions of dollars worth of 20th Century miracles, known as machine tools, humming away like a low, sonorous murmur from a turbine, we were in greater silence than at a typical city intersection. The reason is simple and two-fold: first, the complete absence of riveting, prime culprit in aircraft factory noise production; and second, the almost complete use of power-driven machine tools in aircraft engine manufacture.

Production of the modern aircraft engine is largely one of machining, the unceasing rotation of parts in machine against cutting tools. These machines have optimum efficient speeds at which they are operated. At these speeds, so many minutes or hours are required to produce a finished part. Accordingly, there are no frenzied production drives, "hurry-up" slogans and production contests. In this rock-ribbed New England production center the operators are unhurried, serious, patient men whose primary consideration is the production of a *perfect* part, and this operation is largely in the capable hands of a machine tool asking only for a few basic adjustments from time to time.

Pratt & Whitney Aircraft's main plant is in production on double-row radial engines, the single row *Wasp* and *Wasp Junior* production being moved to mid-West licenses. At East Hartford the R-1830 *Twin Wasp*, R-2000 *Twin Wasp* and R-2800 *Double Wasp* is being produced in quantities that are a military secret, but one paradoxical to the seeming laxity of effort of the workers. But skill does not demand exhausting toil, and highly trained and experienced hands are producing more power for the war birds of the United Nations in a single day than a double portion of back-breaking, perspiring greenhorns could in six months.

How are Pratt & Whitney engines built? To answer that question it is necessary to understand not only the component parts of an engine but the policy and production "know-how" of the Pratt & Whitney management. Since its inception nearly 20 years ago, Pratt & Whitney has utilized the sub-contract method of production, "farming out" various assemblies to specialists. When World War II exploded on an unprepared American aviation industry, Pratt & Whitney ignored the wild scramble for sub-contractors and machine shops which accompanied the President's call for 50,000 airplanes. Her "vendors" were well established oldtimers who had been doing business at the same old stand for the same old firm on the same old



Here she is: the mighty Pratt & Whitney R-2800 *Double Wasp* engine

parts for nearly a fifth of a century! Many humorous (and delightfully smug) stories are told by Pratt & Whitney production men on the deluge of engine and accessory manufacturers of small machine shops waving blueprints and blank checks, and the quiet, calm refusal: "Sorry, Pratt & Whitney has been using all our facilities for 15 years!"

One story in particular concerns the experiences of Ford when plans were being drawn up for the production of *Double Wasps* under license ($1.00 per engine). Confident that the power of their name and reputation for high payments would overwhelm any reluctant small machine shop operator, Ford sent men scurrying around the countryside, blank contracts in hand. The end result, after several months of useless effort, was the construction of a new Ford plant for the production of *Double Wasp* parts and assemblies, all of them under one roof in Detroit!

One tremendous factor in Pratt & Whitney's production records is the near-complete interchangeability of parts in the various engine models. (A cylinder of the original 400 hp *Wasp* engine of 20 years ago can be easily screwed into the crankcase of the present 600 hp *Wasp!*) Its basic assemblies—propeller gearing, crankcase, main power section, induction system and accessory sections—are completely interchangeable and this feature has made the Pratt & Whitney engine one of the most flexible power plants in the world, particularly the production of newer models. A new model can be placed in production at East Hartford in a matter of days, sometimes in less than 24 hours. As a matter of fact the main plant at East Hartford has been designed for just such an operation, production being shifted easily and quickly to meet changes and sudden shortages in military engines dictated by changing military situations.

Typical engine is the R-1830 *Twin Wasp* (used in the Consolidated B-24 *Liberator*, Douglas A-20 *Havoc*, Consolidated PB2Y *Coronado*, Grumman F4F *Wildcat*, and many others), a fourteen cylinder, double row, radial, air cooled model delivering 1200 horsepower for takeoff and equipped with a single stage two-speed blower providing additional power at high altitudes.

The crankcase is made up of six sections, all machined together from aluminum forgings and joined by through bolts on assembly. The nose section houses the reduction gears and the propeller operating mechanism. The power sections (two) form the basic crankcase and contain the cylinders, crankshaft, etc. The blower section houses the supercharger impeller and contains the engine mounting lugs. The blower intermediate section contains the carburetor and impeller gear train, and the aft accessory section contains the innumerable gears and shafts for the various accessories.

Each cylinder is made up of several parts: the barrel is a steel forging with machined cooling fins; the cylinder head is a casting with integral valve mechanism housings; the intake valve seats are of aluminum bronze and the exhaust valve seats steel. The cylinder head while hot is screwed onto the barrel and, upon cooling, shrinks into place in a truly permanent joint.

The pistons are of forged aluminum with heavy ribs on the inside to provide strength with cooling fins on the inside for additional cooling. Each piston has three compression rings, one oil scrapper ring and one dual oil control ring.

(Turn to page 10)

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The crankshaft is of the two-throw, one-piece type supported by three roller bearings and located by the front main bearing. The propeller shaft is supported within the crankshaft by a lead-copper pilot bearing, and in the nose section by a deep groove ball bearing which absorbs the engine thrust.

All "manufacturing" operations are done by Pratt & Whitney's 300 sub-contractors in 29 states. These operations include castings, forgings, etc., with all assembly operations done at East Hartford. Pratt & Whitney pioneered the now basic tenant of "don't let them get too big too fast" as voiced by North American's "Dutch" Kindelberger. In other words, the engine assemblies are built up separately as far as possible before installation so that final installation is a fairly simple operation of bolting three or four major parts together. At East Hartford this "final" assembly is actually the "green" assembly, or the first preliminary assembly of the engine.

The completed engine is hitched to an electric motor which turns it over slowly for several minutes to make sure everything is in operating order. The engine is then installed in a soundproofed test chamber, fired up and run for 7½ hours with engineers keeping constant records of its performance. During this operation a huge chart is made of each individual engine furnishing an exhaustive record of its performance. Many of these engines are connected to generators which operate the plant's electrical system, thereby providing a logical method of recovering the power otherwise expended.

After the "green" run, each engine is *disassembled down to the last cotter pin* and each part inspected with microscopic precision! When each part has passed inspection, the engine is given a final assembly and a final 2½ hour test run. It is then packed in an hermetically sealed bag, placed in a crate and sent to the aircraft factory or to an Army or Navy base. And you can bet your bottom dollar that each Pratt & Whitney engine is ready for perfect, continuous operation upon installation in an airplane!

The story of Pratt & Whitney's birth is an odd one and reveals one of the most curious experiences of modern aviation history. The story actually has its inception during World War I when a young engineer named George J. Mead went to work for the Engineering Division of the U. S. Air Service at McCook Field (now Wright Field) in Dayton, Ohio. Well grounded and painstaking, Mead soon rose to Engineer-in-Charge of the Power Plant Laboratory and was instrumental in the design of several experimental aircraft engines produced by the Army, as well as pioneer of many testing and development techniques now in wide use.

He relinquished this work for a position with the Wright Aeronautical Corp. at Paterson, N.J., where he worked on modifications to the Hispano-Suiza ("Hisso") engine being developed and manufactured by Wright. In due course Mead was appointed Chief Engineer (following the retirement of Henry M. Crane) and placed in charge of engine design.

In 1923 Wright Aeronautical acquired the radial air-cooled engine designs of Charles L. Lawrance and the latter was placed in a consultant capacity with the firm.

Certain differences in design thoughts and policies developed between Mead and Lawrance, so Fred B. Rentschler, President of Wright, suggested that he and

(Turn to page 42)


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12" to 16" WING SPANS
VICTORY SOLIDS $1.50 EA
MOSQUITO
MITCHELL
WILDCAT
THUNDERBOLT
SPITFIRE
LIGHTNING
12" to 16"
—all parts cut to shape—complete kits plus extra 'model helps' and new 'flex-ite' prop. Limited supply on hand.
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Eagle $1.50 ALL BALSA flying model. Originally built for the R. A. F. Recently adopted by the A.A.F. as a dive bomber—42" wing span—balloon-type hardwood wheels in liberally filled kit.
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23" — 30" fighters making war headlines every day. Big flying models that will do you proud with their fine performance. Spitfire, Mustang, Curtiss, P-40F, Vought - Sikorsky, Vultee Vengeance, Thunderbolt.
35c SOLIDS
All-around perfect kits complete with all necessary material and super-detailed plans. Mustang, Curtiss P-40F, Spitfire, Wildcat, Zero, Thunderbolt, Avenger, Typhoon, Airacobra, Wulf '190.'
BLACK WIDOW
The latest twin-boom bomber-strafer that's doing a terrific job in The European Theater!
50c EA.
SUPER-DETAILED SOLIDS
Just take a glimpse at the plans in this kit and observe how complete and thorough a scale job has been done! Select balsa, a 'cinch' to work with! Finished wheels, insignia, cement. Also available—Mosquito, Marauder, P-38 Lightning.
STUKA
PIPER CUB
Combat SERIES Flyers $1.00
3' to 4' WING SPAN
3-4 ft. flyers, full-view, simplified plans — all BALSA construction, wire, true-cut strips, insignia sheets, etc. Choice of 4 standard types.
STINSON
VOUGHT SIKORSKY
BY MAIL:
EAGLE (H&F) kits are leaders at all dealers. If none are near you order direct, including 20c per kit to cover packing, postage.
AN Eagle PRODUCT
Eagle MODEL AIRCRAFT COMPANY
EAGLE BUILDING
Dept. M-2 257 WATER STREET BROOKLYN 1, NEW YORK

15 years ago

FOR a number of years after the first World War, France strove to become the leading Air Power on the continent of Europe. There were men alive then who fully realized that Le Boche had been beaten but not conquered, that they would be back some day for another try at World conquest. How correct they were in their calculations we know now only too well; the events of the past five years speak for themselves. Before France was lulled into the coma of false security she developed several outstanding military types of airplanes. One of these was the Bernard 20 C-1 single seater fighter which was a military development of the Bernard Racer that held the world's landplane speed record in 1924 (278 mph). In response to many requests for details of this sleek fighter MODEL AIRPLANE NEWS presented full size plans and construction notes for a rubber powered flying scale model.

Selection of judges for the Curtiss *Robin* scale model contest was announced this month; they included Clarence D. Chamberlin and "Casey" Jones. Photographs of the trophies awarded the winners of this contest appeared.

The course in Airplane Design by Ken Sinclair continued this month, stressing correct takeoffs of large planes and models. Diagrams showing both correct and incorect takeoffs were given and the course told how to incorporate the correct procedure in design.

Plans for an inexpensive tractor seaplane appeared on page 33, the idea being that the modeler could work leisurely while chill winter winds were blowing and have something different to fly when the mild spring weather arrived.

The Advisory Board, in answer to a flood of inquiries about helicopters and autogiros, explained the differences between these two types. We of today are fortunate in that such confusion is cleared automatically by our familiarity with several successful helicopter designs. . . . The listing of airplanes used by Britain during World War I continued, together with several that were used by France. William Eichbaum of Shepherd, Texas questioned the Advisory Board about the difference between a radial engine and a "V" type engine. The Board explained that in a radial engine the cylinders were mounted in a circle, whereas in a "V" type the cylinders are so situated that when one looks at the engine from either front or rear the cylinders assume the shape of the letter "V." . . . James Frazer Jr. of Bayonne, N.J. built an R.O.W. model that would fly hand launched but would not take off from water. He wished the Board to advise him as to where the fault lay. It was suggested that the model might be underpowered or that the angle of incidence in the wing was not great enough. . . .

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Tested Performance—Improved Design

. . . it's the everdependable motor you know so well with several of the post-war advances already incorporated: Advanced-type gas control method, repositioning of exhaust manifold.

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Contains Blue-Print and Wiring Diagram.

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Bore .... **.900**
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Displ. .... **.604**
Weight—Bare 12 ozs.

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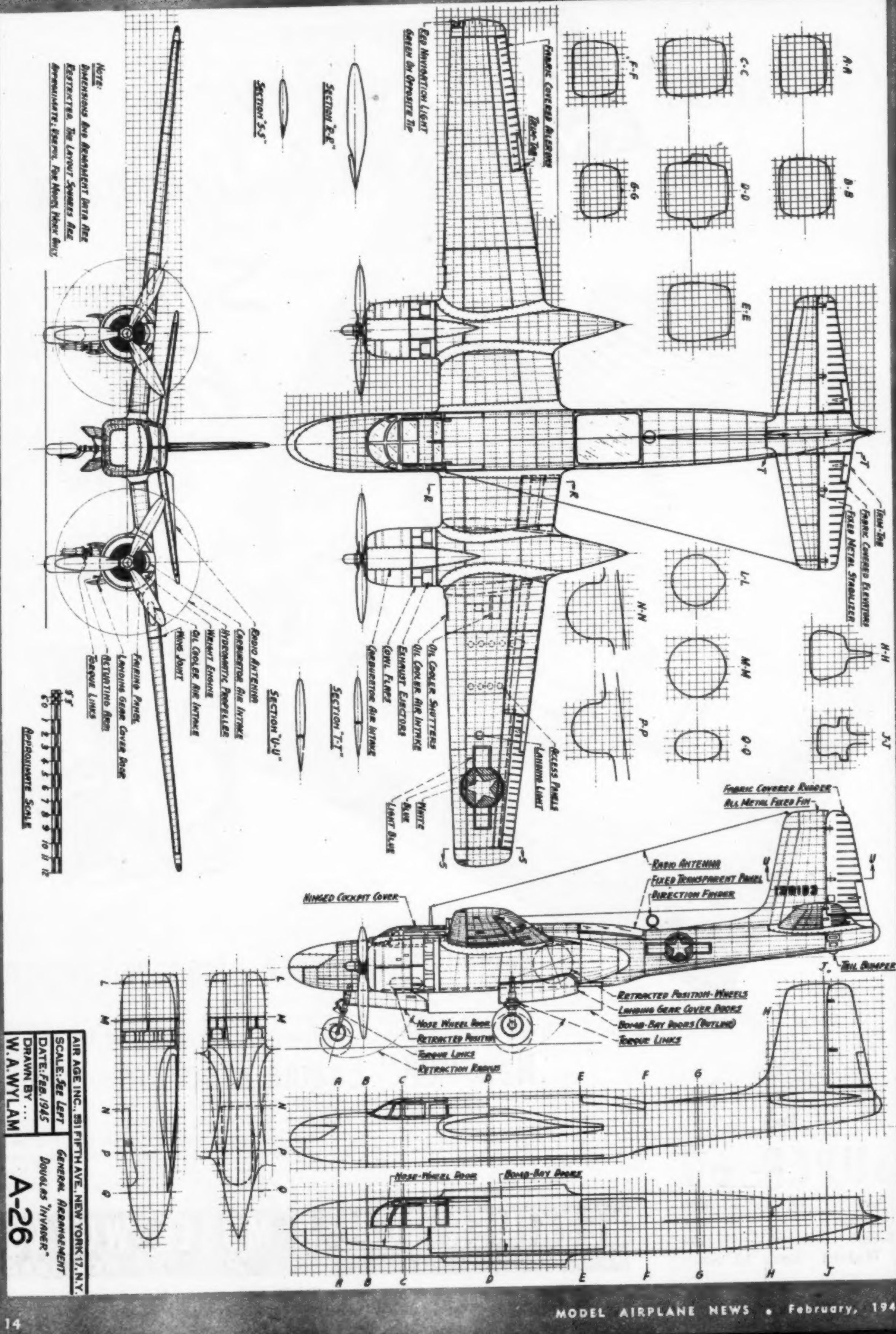

AIR AGE INC. 551 FIFTH AVE. NEW YORK 17, N.Y.
GENERAL ARRANGEMENT
DOUGLAS "INVADER"
SCALE: SEE LEFT
DATE: FEB. 1945
DRAWN BY... W. A. WYLAM
A-26
NOTE:
FABRIC COVERED AILERONS
TRIM-TAB
RED NAVIGATION LIGHT
GREEN ON OPPOSITE TIP
SECTION "R-R"
SECTION "S-S"
SECTION "T-T"
SECTION "U-U"
RADIO ANTENNA
CARBURETOR AIR INTAKE
HYDROMATIC PROPELLER
WRIGHT ENGINE
OIL COOLER AIR INTAKE
WING JOINT
FAIRING PANEL
LANDING GEAR COVER DOOR
ACTUATING ARM
TORQUE LINKS
APPROXIMATE SCALE
OIL COOLER SHUTTERS
OIL COOLER AIR INTAKE
EXHAUST EJECTORS
COWL FLAPS
CARBURETOR AIR INTAKE
ACCESS PANELS
LANDING LIGHT
WHITE
BLUE
LIGHT BLUE
TRIM-TAB
FABRIC COVERED ELEVATORS
FIXED METAL STABILIZER
FABRIC COVERED RUDDER
ALL METAL FIXED FIN
RADIO ANTENNA
FIXED TRANSPARENT PANEL
DIRECTION FINDER
HINGED COCKPIT COVER
TAIL BUMPER
RETRACTED POSITION-WHEELS
LANDING GEAR COVER DOORS
BOMB-BAY DOORS (OUTLINE)
TORQUE LINKS
NOSE WHEEL DOOR
RETRACTED POSITION
TORQUE LINKS
RETRACTION RADIUS
NOSE-WHEEL DOOR
BOMB-BAY DOORS
A-A
B-B
C-C
D-D
E-E
F-F
G-G
H-H
J-J
L-L
M-M
N-N
O-O
P-P

INVADER!

"This airplane, properly employed, can be the greatest striking arm of the Air Force."
COL. J. H. DAVIES, AAF

Plane on the Cover

History

IN 1936 Ed H. Heineman, Assistant Chief Engineer of Northrop Corporation—which was formed with the financial assistance of Donald Douglas to develop the designs of John K. Northrop—laid out a preliminary design for a twin engine observation-attack plane. In the fall of 1936 the project was placed on the shelf while other designs were completed and placed in production. In the spring of 1937 the design was again revived and further work done on it, but again that fall it was temporarily put aside.

In January 1938 the Army Air Corps announced a competition for a new attack-bomber and the Northrop Model 7, as the design was known, was hauled out, revised according to the Air Corps specification and submitted as a bid. The Army Air Corps gave their approval to the design and in September 1938 the speedy, twin engine Model 7 made its first test flight.

With Germany marching across the face of Europe and the free nations of the continent frantically rearming, France turned to the United States for help. Through the cooperation of the Army Air Corps, the French Government was permitted to purchase many American warplanes including the Curtiss P-36 *Mohawk*, the North American NA-57 trainer, the Consolidated B-24 *Liberator* and numerous lesser known types. The Air Corps reluctantly turned over its contemplated orders for the Northrop Model 7 to the French and a contract for 100 of the type was signed in secret.

At this time Northrop resigned from the Northrop Corp. to form his present company and the firm became known as the Douglas El Segundo Division. With major modifications the speedy, deadly attack-bomber was placed into production as the Douglas DB-7B and the first of the new French models was completed in the summer of 1939 as war clouds sunk low over Europe.

The first DB-7B, with Douglas test pilot Johnny Cable at the controls, was approaching Mines Field, El Segundo Division test field, for a landing one noon when one of the engines suddenly failed. Low over the field, Cable decided to bank into a landing with the good engine on the high side of the bank. In an instant the craft crashed in a burst of flame and smoke amidst the parked cars of North American Aviation employees. Not one but two occupants of the plane were pulled to safety, Cable dying shortly after. The other occupant was Captain Paul Chemedlin, representative of the Franch Armee de l'Air, and the secret was out: America was building warplanes for threatened France.

The DB-7B's were rushed to France and many of them saw action in the furious fighting as the Germans broke through the vaunted Maginot Line.

But mighty France fell before the last of her DB-7B's could be delivered and the British Purchasing Commission assumed all unfilled airplane contracts of the French Government. In the R.A.F. the DB-7B became known as the *Boston* and later the *Havoc*. When our imminent entrance into the war faced us, the Army Air Forces awarded production contracts to Douglas for the type, designated the A-20, and the *Havoc*, as it is also known in the AAF, has played a vital role in our aerial battles around the world.

As is his habit, Donald Douglas no sooner witnessed the successful test flight of his latest airplane than he was back at his drawing board hard at work on a newer design. With the A-20 smashing the enemy on every front, Douglas set to work on a new twin engine attack-bomber, one incorporating the lessons acquired from the previous model but including all the latest developments of aerodynamic research, design and production techniques.

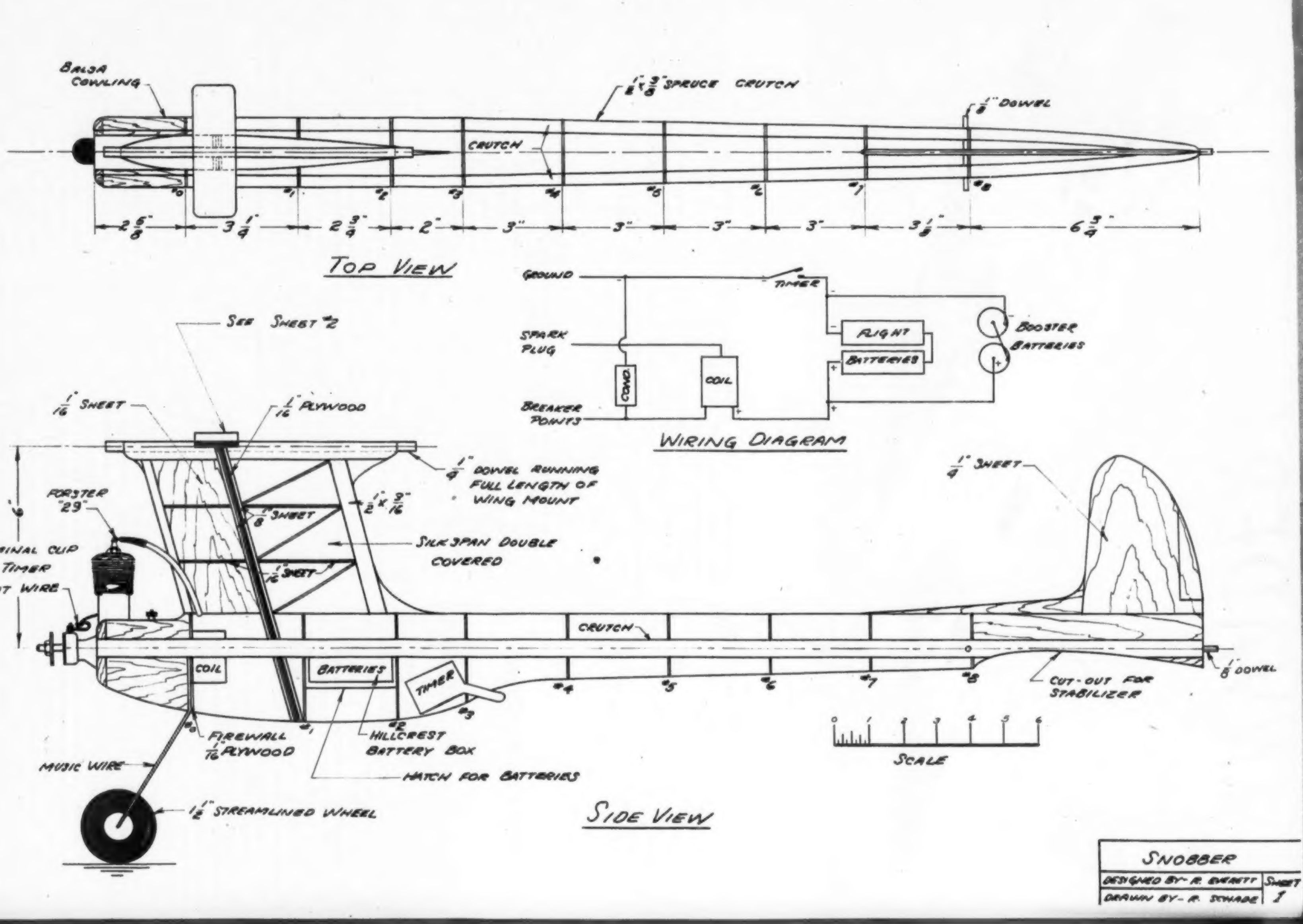
The Army Air Forces in Washington began the study of a super attack-bomber in 1940 and prepared detail specifications of what it wanted. Douglas answered with the A-26, known as the *Invader*, the most versatile of its type and the fastest American built bomber today. It may be used as a fighter, bomber, night fighter, torpedo, destroyer, strafing or attack plane.

Structure

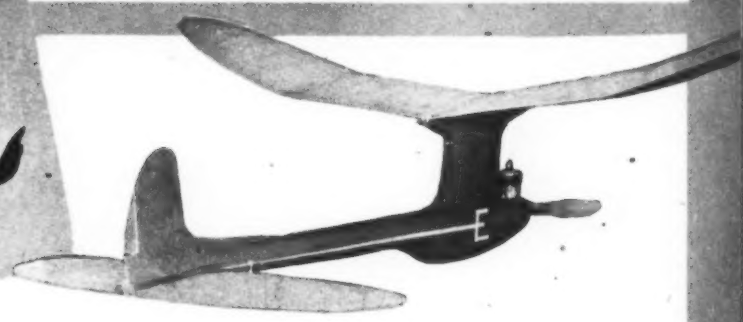
The A-26 *Invader* was the first Douglas airplane to be designed for mass production methods and it contained some rather revolutionary ideas. The shortness of the production lines indicate the success of this endeavor. These ideas consisted in general of utilizing the new NACA low drag laminar flow airfoil section, combined with new Douglas-designed slotted type wing flaps and a new type of wing structure.

The wing is of two-spar cantilever construction composed of complete left-hand and right-hand wing panels including engine nacelles. The spars are built up from long, unspliced spar caps having integral end fittings. Use of these spar caps necessitated new rolling processes by the aluminum mill. High speed automatic machining processes split the rolled billet diagonally and then cut the cap to shape. Separately built wing panels using chordwise stiffeners and heavy skin form between the spars and allow wing deflection in flight without wrinkling of the wing skin, thus preserving the laminar flow. Special newly designed Douglas-type slotted flaps are installed on the trailing edge portion of the wing provid-

(Turn to page 50)


BALSA COWLING
1/8" x 3/8" SPRUCE CRUTCH
1/8" DOWEL
CRUTCH
#0 #1 #2 #3 #4 #5 #6 #7 #8
2 5/8" 3 1/4" 2 3/4" 2" 3" 3" 3" 3" 3 1/8" 6 3/4"
TOP VIEW
GROUND
TIMER
SPARK PLUG
BREAKER POINTS
COND
COIL
FLIGHT
BATTERIES
BOOSTER BATTERIES
WIRING DIAGRAM
SEE SHEET #2
1/16" SHEET
1/16" PLYWOOD
1/4" DOWEL RUNNING FULL LENGTH OF WING MOUNT
1/2" x 3/16"
1/8" SHEET
1/16" SHEET
SILKSPAN DOUBLE COVERED
FORSTER "29"
TERMINAL CLIP FOR TIMER POINT WIRE
6"
1/4" SHEET
CRUTCH
COIL
BATTERIES
TIMER
FIREWALL 1/16" PLYWOOD
HILLCREST BATTERY BOX
HATCH FOR BATTERIES
MUSIC WIRE
1 1/2" STREAMLINED WHEEL
CUT-OUT FOR STABILIZER
1/8" DOWEL
0 1 2 3 4 5 6
SCALE
SIDE VIEW
SNOBBER
DESIGNED BY - R. EVERETT
DRAWN BY - R. SCHADE
SHEET 1

Snobber



by **DICK EVERETT**

SNOBBER is the result of an effort to build a very strong model with as little weight as possible. It had been decided to build the ship with a wing loading of 10 oz. per sq. ft. and much strength was concentrated on the wing mount. As you will probably note, the mount was made to stay on; too many mounts had a habit of parting company with the fuselage. A removable landing gear was built into this model so that you can fly the ship with or without it.

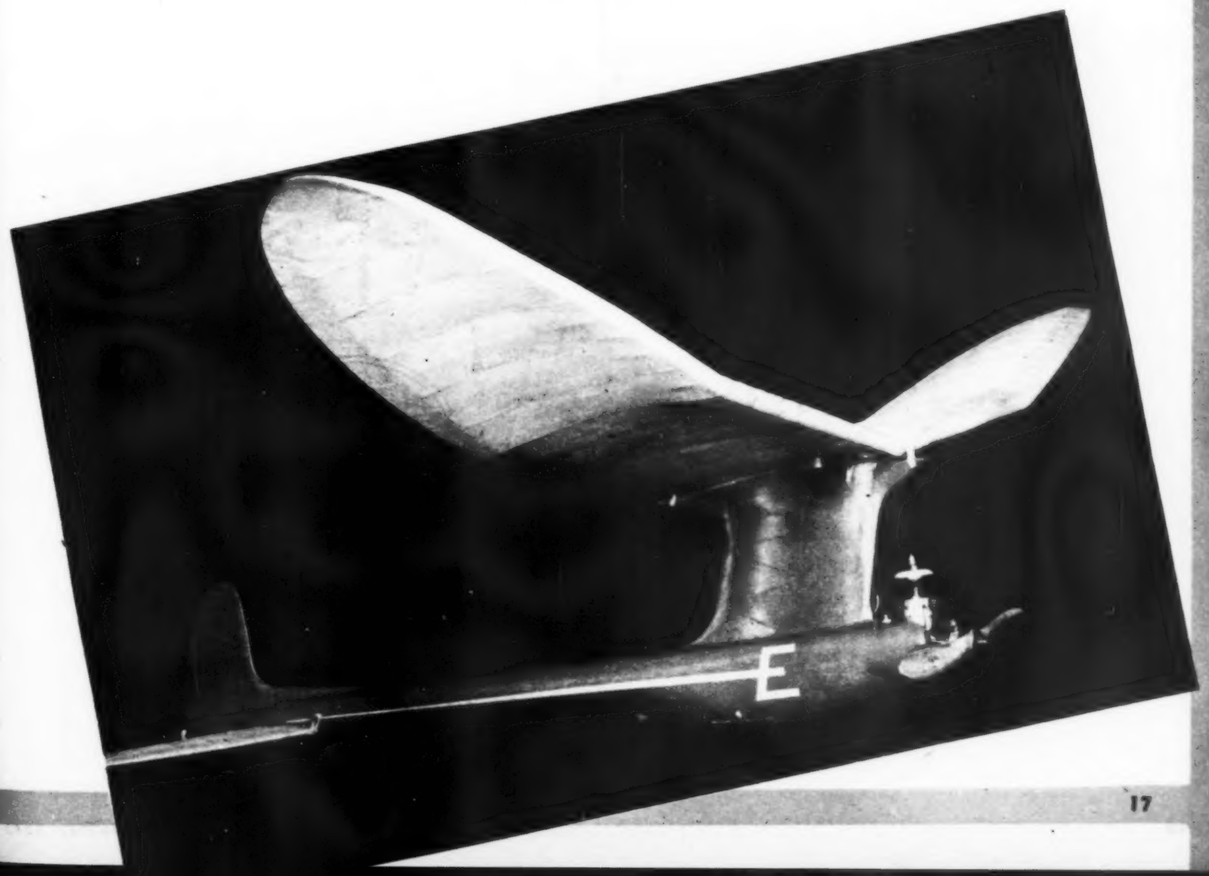
The results were more than satisfactory. It was test flown at a contest and before the contest was over it ticked off flights of 2:00 min. consistently. Winning time was 2:19; second with *Snobber* was 2:07. Rules allowed a ten sec. max. motor run, the winning ship being a Class C job. No adjustments were required other than turning the tab on the fin. Its strength was amazing; it piled into a tree and then down about 75 ft. into the ground without any damage other than breaking the prop. Subsequent test flights have been very promising, going upstairs in a nice flat climbing turn and gliding in a very flat soaring glide. Several long flights have been obtained. All of these flights were made with a ten second motor run, so when a twenty second motor run is used—look out—you will need a car for a long chase.

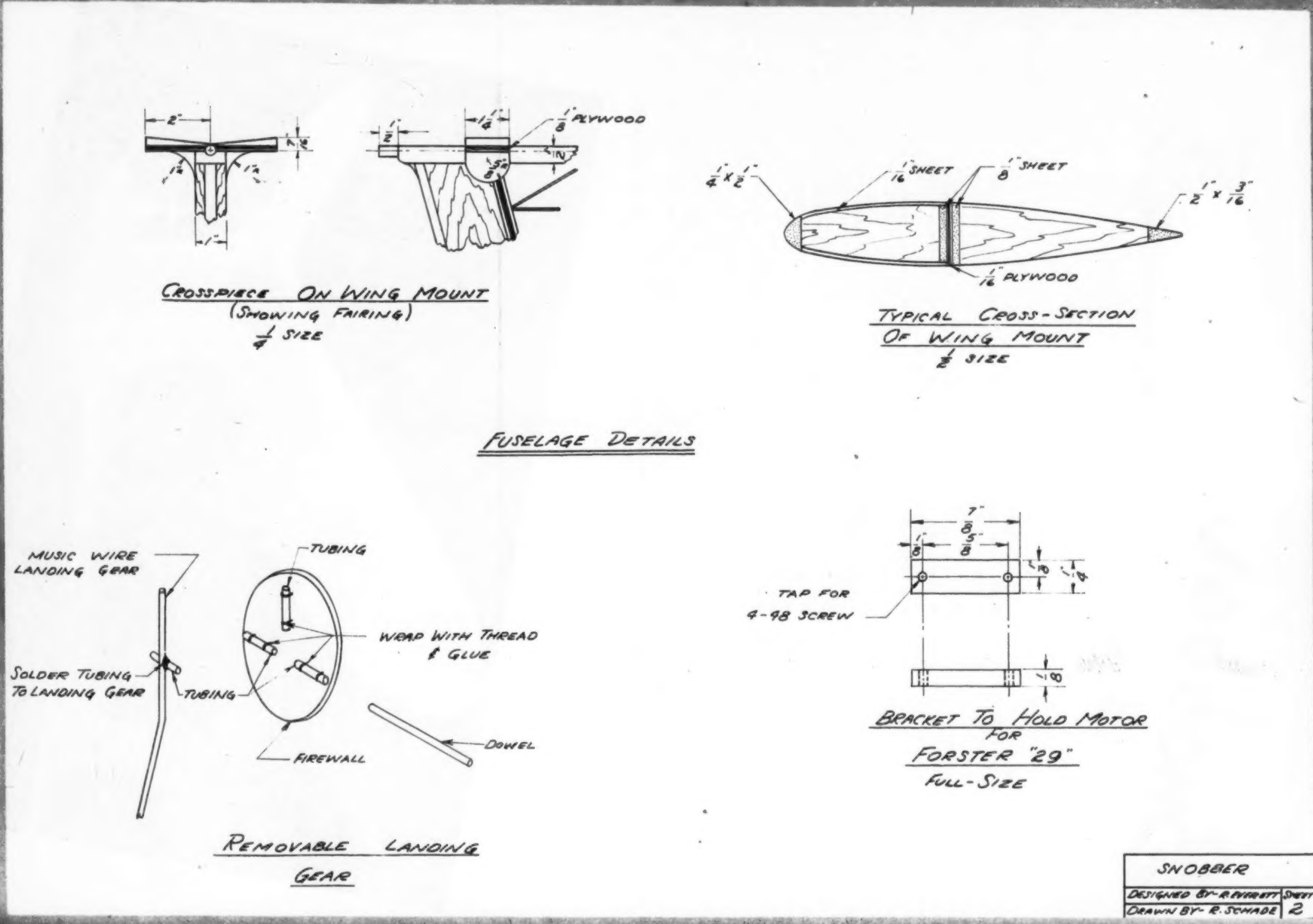
"Nuff said"—let's get to work and build this outstanding model.

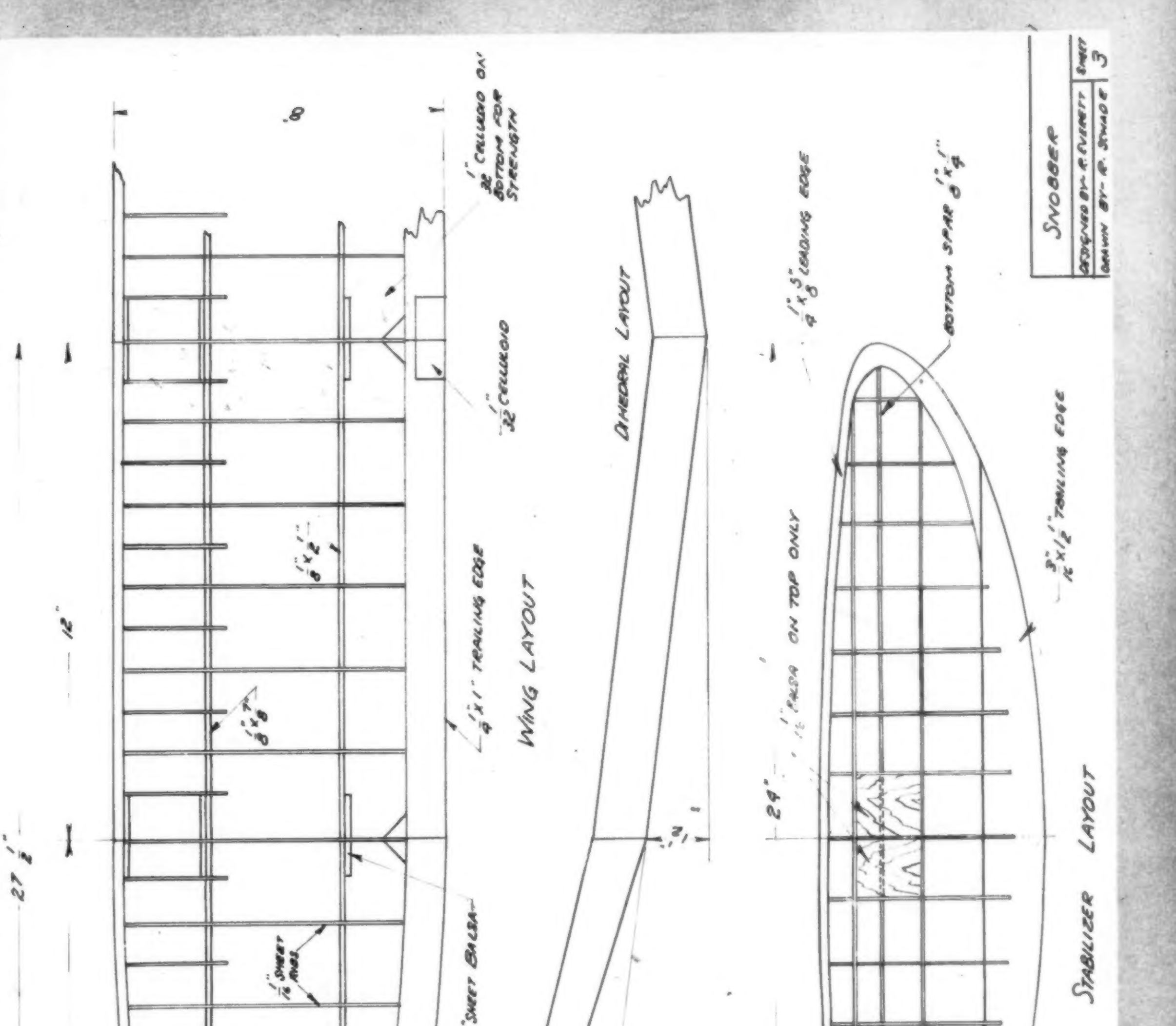
FUSELAGE—As you will probably note, everything is fastened to the crutch. The crutch is made of spruce 3/8 x 1/2; this will really take a beating so you can depend on this ship for a lot of contests. Lay out the top view of the fuse and install 1/8 x 1/2 spaces to hold the crutch to its desired shape. Let it dry thoroughly then lift from the board. In the meantime make all the fuse formers and wing mount formers. You will note the mount former is of 1/16" plywood sandwiched between two 1/8" sheets. Install all formers and let dry thoroughly. Cement the coil battery box and timer in place and complete wiring. Please note the wiring diagram for it differs from the orthodox one; you will find the inside batteries will last a lot longer if the diagram shown is used.

Construct the landing gear and bind tubing to firewall. If you'd rather you can install a stationary landing gear by using the method shown and wrapping the strut with thread too. The 1/8" steel brackets were used to simplify the method of motor attachment. When using this bracket the screws go in from the tip and are easy to get to when they become loose. Install the motor and cement blocks for fairing. Finish the wiring at this time, mounting the condenser on the motor. The fuse can be planked with 1/8" balsa or you can use 1/8" x 1/4" stringers and cover with silk or paper. Finish the wing mount at this time taking care to get the correct amount of incidence. The leading edge must be 3/16" higher than the trailing edge.

(Turn to page 64)

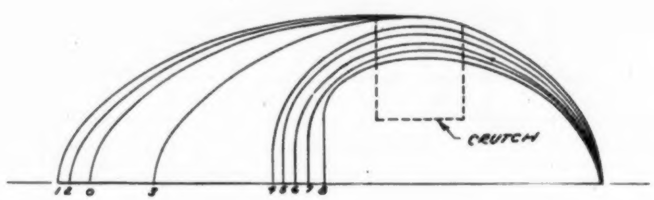



CROSSPIECE ON WING MOUNT
(SHOWING FAIRING)
1/4 SIZE
2"
1"
1/2"
1 1/4"
1/8" PLYWOOD
TYPICAL CROSS-SECTION
OF WING MOUNT
1/2 SIZE
1/4" x 1/2"
1/16" SHEET
1/8" SHEET
1/16" PLYWOOD
1/2" x 3/16"
FUSELAGE DETAILS
MUSIC WIRE
LANDING GEAR
SOLDER TUBING
TO LANDING GEAR
TUBING
WRAP WITH THREAD
& GLUE
FIREWALL
DOWEL
REMOVABLE LANDING
GEAR
7/8"
5/8"
1/8"
TAP FOR
4-48 SCREW
BRACKET TO HOLD MOTOR
FOR
FORSTER "29"
FULL-SIZE
SNOBBER
DESIGNED BY- R. EVERETT
DRAWN BY- R. SCHADE
SHEET
2


SNOBBER
DESIGNED BY- R. EVERETT
DRAWN BY- R. SCHADE
SHEET 3
WING LAYOUT
27 1/2"
15 1/2"
12"
8"
1/4" x 5/8" LEADING EDGE
1/4" x 1" TRAILING EDGE
1/8" x 7/8"
1/8" x 1/2"
1/16" SHEET RIBS
1/8" SHEET BALSA
1/32" CELLULOID ON BOTTOM FOR STRENGTH
1/32" CELLULOID
BAMBOO PAPER
DIHEDRAL LAYOUT
3"
1 3/4"
NOTE SCALE THE SAME AS SHEET 1
STABILIZER LAYOUT
24"
1/16" BALSA ON TOP ONLY
1/4" x 5/8" LEADING EDGE
BOTTOM SPAR 1/8" x 1/4"
3/16" x 1/2" TRAILING EDGE
1/16" SHEET RIBS
TOP SPARS 3/16" x 1/16"
DOUBLE COVERED SILKSPAN
3/16" SHEET

RHODE ST. GENESE-35		
STATION	UPPER	LOWER
0	3.73	3.73
1.25	6.65	1.55
2.5	7.93	.93
5.0	9.68	.47
7.5	11.20	.24
10.0	12.25	0
15.0	13.88	0
20.0	14.93	0
30.0	15.15	0
40.0	14.48	0
50.0	13.30	0
60.0	11.43	0
70.0	9.10	0
80.0	6.30	0
90.0	3.15	0
95.0	1.63	0
100.0	.20	0

WING ORDINATES

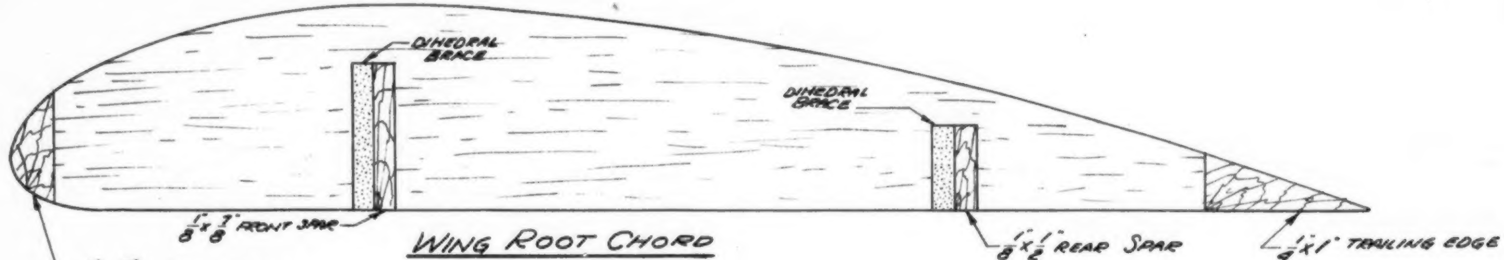


FUSELAGE BULKHEADS

FULL SIZE

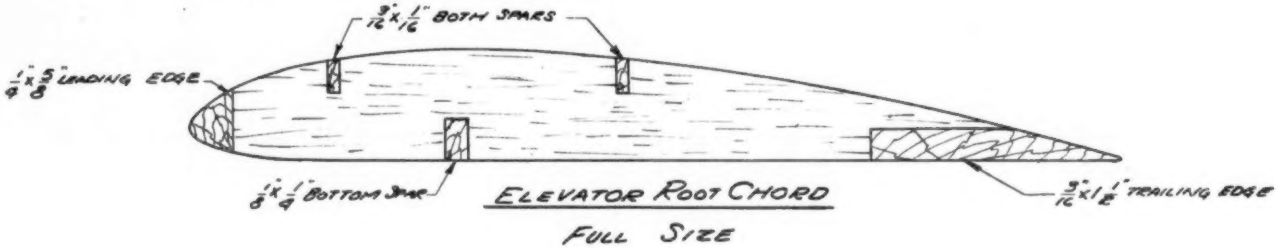
CLARK-Y		
STATION	UPPER	LOWER
0	3.50	3.50
1.25	5.45	1.93
2.5	6.50	1.47
5.0	7.90	.93
7.5	8.85	.63
10.0	9.60	.42
15.0	10.68	.15
20.0	11.36	.03
30.0	11.70	0
40.0	11.40	0
50.0	10.52	0
60.0	9.15	0
70.0	7.35	0
80.0	5.22	0
90.0	2.80	0
95.0	1.49	0
100.0	.12	0

STABILIZER ORDINATES



WING ROOT CHORD

FULL SIZE



ELEVATOR ROOT CHORD

FULL SIZE

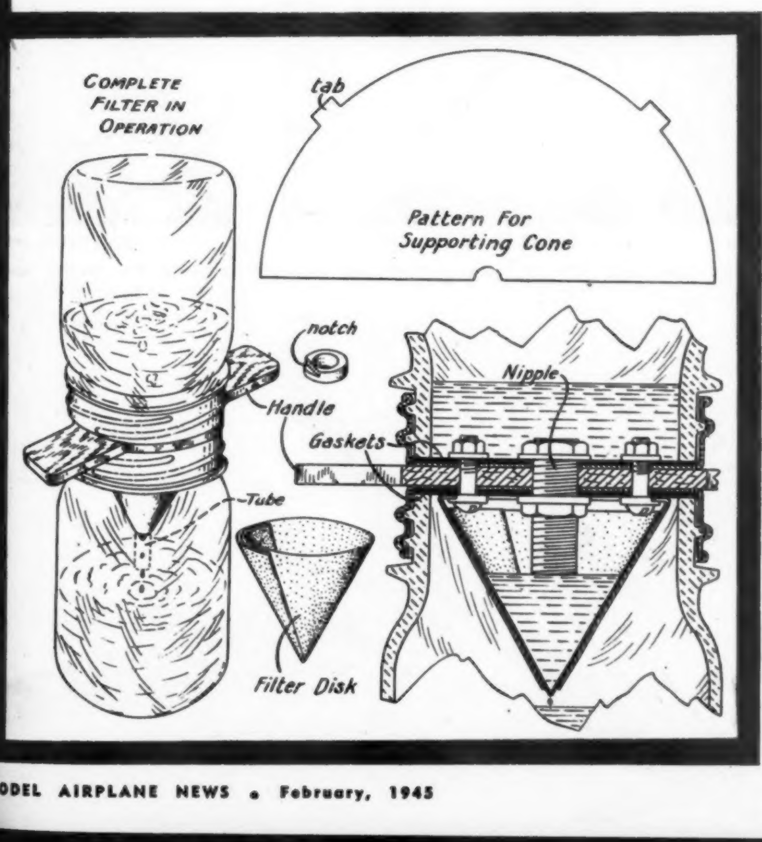
SWOBBER	
DESIGNED BY-R. EVERETT	SHEET
DRAWN BY-R. SCHADE	4

FILTERED FUEL IS SAFER

by **RAY RUSHER**

TO MINIMIZE the possibility of carburetor passages clogging, and grit or dirt getting into that precious model plane or car engine that you want to last for the duration, the fuel should be filtered—not merely strained. Ordinary filter paper, obtainable at any drug store, can be used but it presents the problem of evaporation of the lighter fractions of the gas in the gas-oil mixture during the filtering process which takes three or four hours per pint of fuel. Here is a filter that entirely encloses the fuel in an airtight receptacle while filtration is taking place.

Two pint or quart jars, having screw top lids of the type shown in the drawing, are used. Salad dressing and peanut butter usually come in jars of this character. A 1/8" x 1-1/4" pipe nipple or brass nipple of the kind used in electrical fixtures is inserted through an opening formed in the center of each lid and through a handle of 3/16" or 1/4" plywood and located between the lids as shown in the sectional view. Suitable gaskets and washers are used to form a liquid and air-tight joint. Gasket material such as "Vellumoid" should be used as it is gasoline and oil proof. Waxed paper or cardboard will not do.



Two screws with washers and nuts pass through both lids and the handle to keep them from turning relative to each other when removing or replacing the lids. A suitable size for the screws is No. 8-32. The washers are notched with a file to serve the additional purpose of mounting a removable supporting cone by rotating its tabs into the notches.

The supporting cone is a half circle of tin, the pattern being given for one that is suitable in size for a fruit jar. The half circle is formed cone shape and the two tabs bent inwardly. The supporting cone can also serve as a funnel for pouring fuel into a narrow mouthed bottle or fuel can, if you solder the edges together and solder a short piece of 3/16" or 1/4" diameter tin or brass tube to the lower end of the cone. This is shown by dotted lines in the drawing of the complete filter. A disk of filter paper 4" in diameter is folded at the exact center and then again at right angles to the first fold. The filter disk is then shaped as shown to fit in the supporting cone. The resulting assembly of filter disk and supporting cone may be termed a "filter cone."

To operate the filter, first be sure the lower jar, the supporting cone and the filter disk are perfectly clean and free of lint. Pour the fuel into the upper jar, about three-quarters full, invert the lids (with the filter cone on them) and screw the assembly on the jar. Invert the lower jar, screw it in place and then quickly invert the entire filter.

Fuel will start flowing down through the nipple while air flows upward through it and bubbles up through the fuel in the upper jar. When the filter cone is filled to the level of the lower end of the nipple the fuel will filter through the filter paper and drip into the lower jar. As the level of the fuel in the filter cone lowers, air displaced from the lower jar will pass over the upper edge of the filter cone and then up through the nipple to permit additional fuel to flow down into the filter cone, thus automatically maintaining it only full enough to filter properly. This prevents any fuel from spilling unfiltered over the upper edge of the cone and lets you forget about the filtering process until completed.

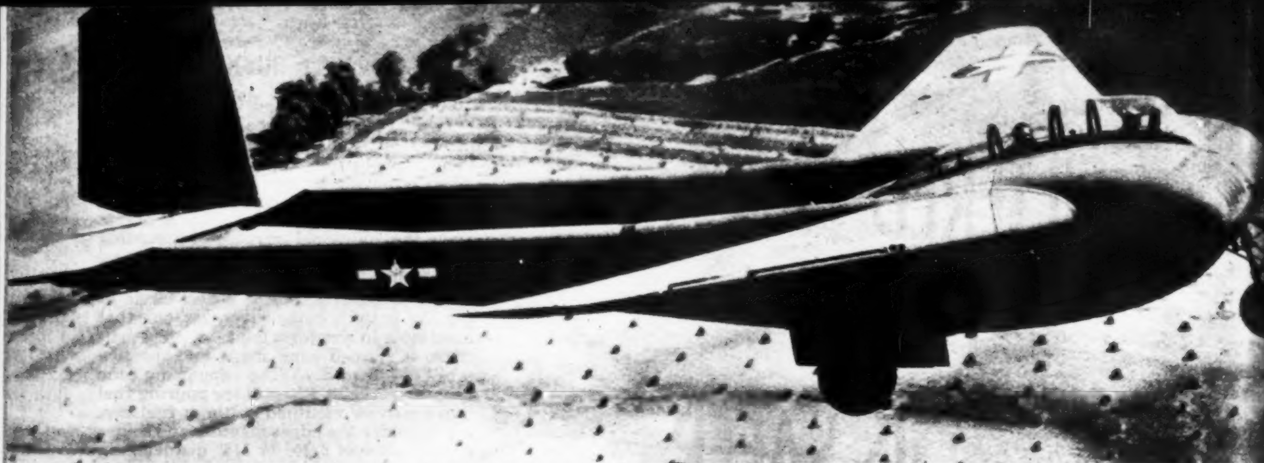
At the same time no evaporation can occur to reduce the octane rating of the fuel and increase the original oil-to-gas proportion of the mixture. To avoid the inconvenience due to the time required for filtering, the author starts a new batch of fuel through the filter as soon as it is emptied and uses the filter for storage until such time as more fuel is needed.

• •

DID YOU KNOW THAT:

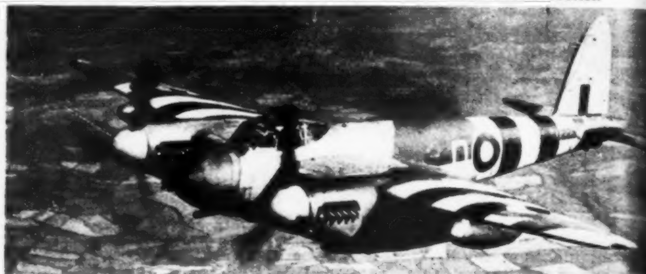
..Those small rubber discs in each window of the Douglas C-47 *Skytrain* and Curtiss C-46 *Commando* are merely for psychological effect? (Theoretically, airborne soldiers can stick a rifle barrel through the openings and fire at attacking enemy aircraft, but the chances of hitting anything are nil. However, if a soldier can feel that he's fighting back at the enemy it's a big relief!)

..Donald Douglas was appointed Chief Civilian Aeronautical Engineer of the Signal Corps in World War I? When he arrived in Washington ready to go to work, he had to cool his heels for several months doing nothing. Reason: to receive the appointment he was required to pass a Civil Service examination and there was no one in Washington who knew enough about aeronautical engineering to prepare a set of test questions!



Experimental XCG-16 cargo glider developed for Army Air Forces is a semi-flying wing type with cargo carried within airfoil section

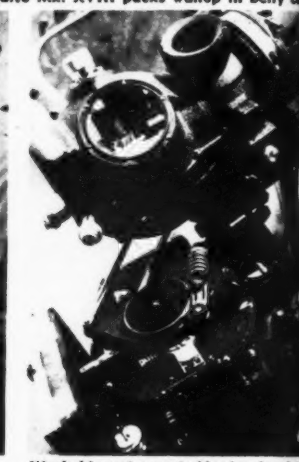
Air-sea rescue technique is simplified by Sikorsky helicopter



Latest version of DeHaviland Mosquito Mk. XVIII packs wallop in belly

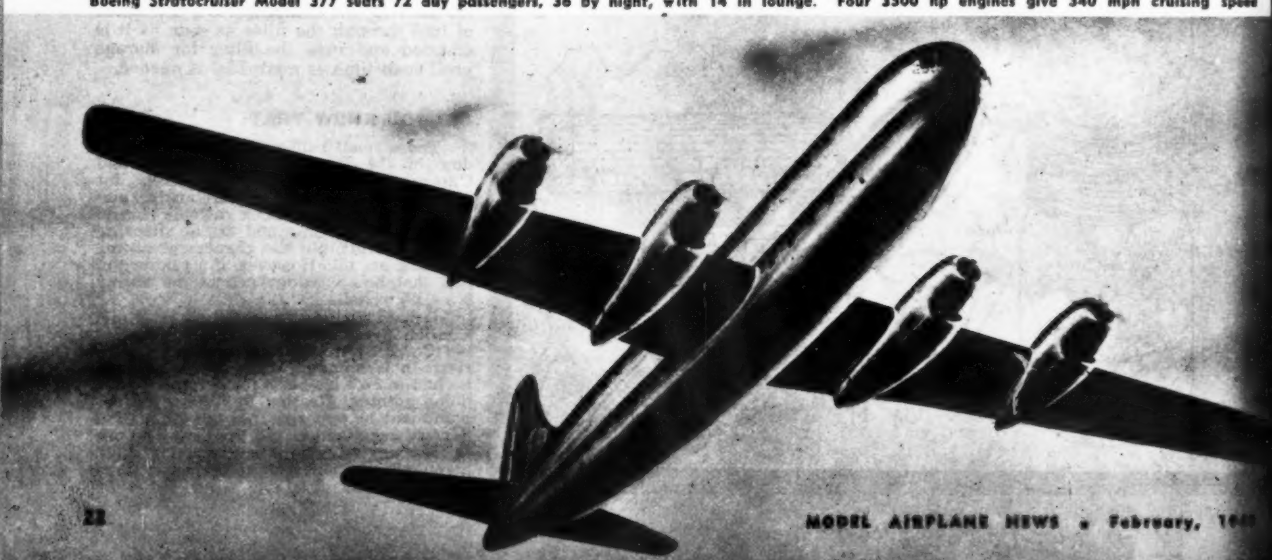
Captured Henschel Hs 293 is early radio control winged bomb

Ace-of-aces Dick Bong has downed 38 E.A.



War's biggest secret: Norden bombsight

Boeing *Stratocruiser* Model 377 seats 72 day passengers, 36 by night, with 14 in lounge. Four 3500 hp engines give 340 mph cruising speed



AIR AGE FRONTIERS

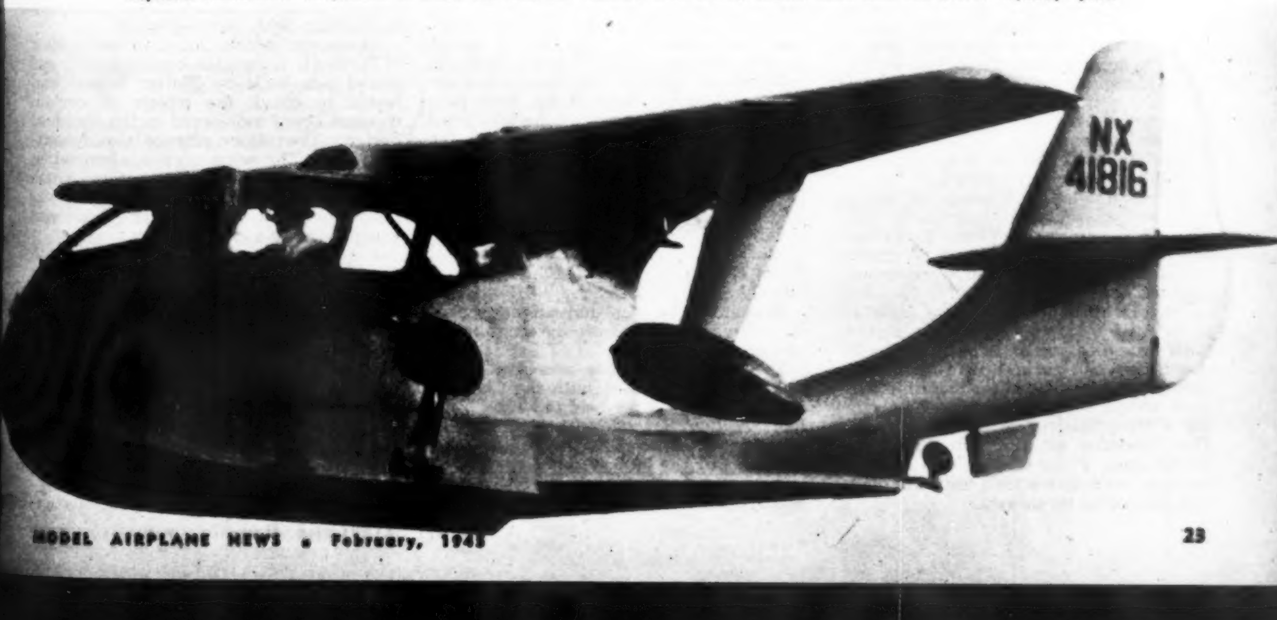
First photo of Messerschmitt Me-262 jaypee

Monster A.A.F. CG-10A cargo glider has retractable nosewheel and folding tail boom stowage

Famed R.A.F. *Seafire* now has rocket assisted takeoff units both wings

"Postville Express" is first Boeing B-29 to unload on Tokyo

Republic *Thunderbolt Amphibian* is ready for post-war delivery with 175 hp engine, clean lines and $4000 "flyaway" price



SCIENCE

Airfoils and Streamlining

The old master drops a few hints for both beginner and expert

by **CARL GOLDBERG**

EVERY model builder who designs his own ships has strong ideas on the subject of a "good wing section." Some swear by the Eiffel 400, many like the RAF-32; others won't use anything but the N.A.C.A. 6409, or a Clark Y, or a Grant X-8, or a Goldberg G-5. Some fellows are just plain cynical and "butcher" out any curve that happens to please their eye at the moment, saying, "It doesn't make any difference." A great many are certain that the glide is much better if you use "undercamber"; others insist a flat-bottom wing is just as good, and much simpler to build.

Most model designers have spent many absorbing hours intently studying the charts which show the performance of different airfoil sections under wind tunnel tests. But there are so many things to consider that it's no wonder there is such wide disagreement on which section is best. Of course, no model builder would use a section if he didn't like the "looks" of it! Next, some go by the lift-drag ratio; that is, they say the section which has the highest proportion of lift to drag is the right one to use. In addition, others worry about the maximum lift coefficient, the center-of-pressure movement, whether the leading edge is thick or thin, how the shape will accommodate spars, etc. To further complicate matters, one wind tunnel gets different results from another. The N.A.C.A. says in Report No. 124, "It is a well known fact that the results obtained in different laboratories, because of their individual methods of testing, are not strictly comparable even if proper scale corrections for size of model and speed of test are supplied. It is, therefore, unwise to compare too closely the coefficients of two wing sections tested in different laboratories. Tests of different wing sections from the same source, however, may be relied on to give true relative values."

The answers to all these questions most assuredly will *not* be found in this article. However, the results of certain model tests and observations will prove rather interesting—and perhaps surprising.

To begin with, several years ago the writer conducted a number of gliding tests on different airfoil sections. The RAF-32, Clark Y, M-6, Grant X-9, Goldberg G-5, and a special thin high-undercamber "bird-like" section were chosen. Each of these was very carefully built, by expert model craftsmen, to maintain closely the correct curve of the section. Each wing measured 5' in span, with a 10" chord, and had an area of 4 sq. ft. The test glider was loaded so that the complete weight ready to fly was 2 lbs., giving a wing loading of 8 oz. per sq. ft. The incidence of each wing could be varied from 0° to 6° and was adjusted through preliminary tests until the model was sinking at its slowest.

The tests were made in the 124th Field Artillery Armory in Chicago, the model being glided from the balcony and carefully timed until it hit the ground. The object was to determine which wing would give the slowest sinking speed; it was rather unfortunate that lack of time prevented accurately measuring the distance of glide as well. Before giving the actual timed results, let me describe a little experience I used to have while on tour a few years ago. In telling the audience about these gliding tests I would mention that the Clark Y took 10 seconds to reach the ground, and then ask their opinion as to the times of the other sections. The estimates ran all the way from 4 seconds for the M-6 to 18 seconds for the G-5 (friend of mine in the crowd?). The results actually were as follows:

Clark Y	10	seconds
RAF-32	10	seconds
Goldberg G-5	10-2/5	seconds
M-6	9-3/5	seconds
Grant X-9	10-1/5	seconds
"Birdlike"	9-4/5	seconds

Thus it can be seen that sinking speeds do not vary much with different *forms* of wing sections.

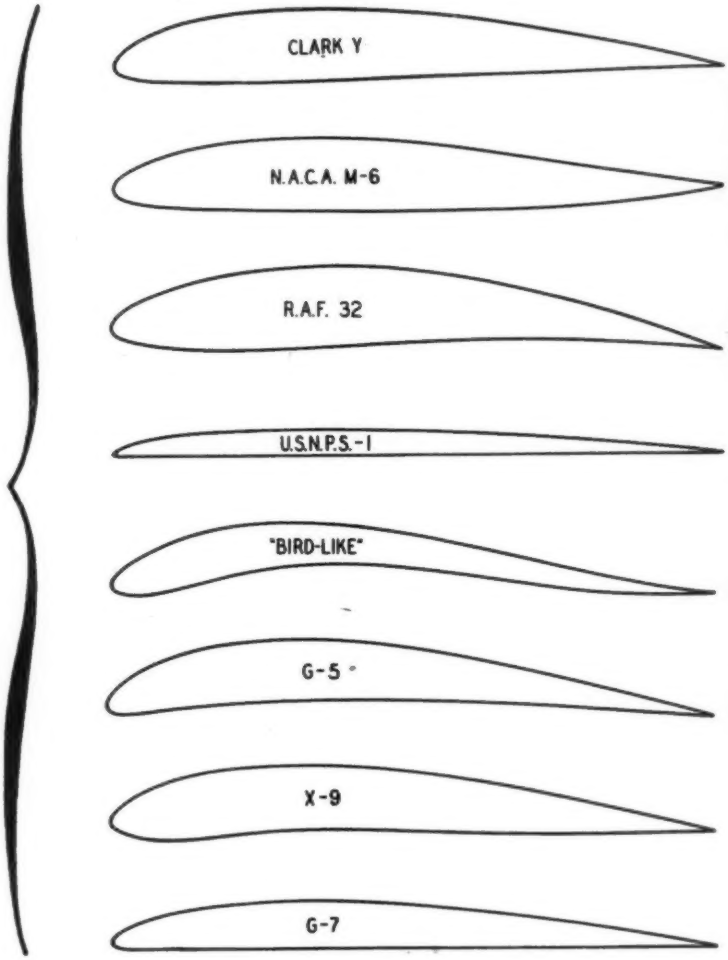
The distance of glide was seen to be greatest with the M-6, with the Clark Y, X-9 and G-5 not far behind. The "bird-like" section flew slowest and traveled the shortest distance.

Some months later a different type of test was made. This time the G-5, which had turned out so well in the foregoing glide tests, was interchanged with a new thin section called the G-7, on an early model of the *Interceptor*. Using motor runs of about 12 seconds, the ship when equipped with the G-5 wing averaged about 2 minutes total flight. When the thin wing was mounted the average time was 2 min. 35 sec. Careful observation indicated that with the thin G-7 wing the ship climbed faster, reaching a distinctly higher altitude, and glided noticeably flatter than with the G-5 wing.

About six months later, in the winter of 1940-41, a special experimental gas model was built by Walter Eckart and tested to check the effects of certain changes being considered in the standard design. The major change aerodynamically was the wing section. Instead of the regulation G-5, the section which proved so superior on the *Interceptor* was used—the G-7. Also, the ship was equipped with a neat cowling.

A great many flights were made with the ship, but rarely if ever did it show signs of "floating." Although the climb was superior to the regular *Zipper*, the glide was distinctly poorer. One day it was being tested near a *Zipper* which had motor trouble. The "special," with motor running nicely, would climb considerably higher on flight after flight, but it just wouldn't stay there, while the G-5 Zipper floated slowly down. It was indeed exasperating to see the cleaner "special" take a beating from the older job.

So here we had a set of curious ex-



(Top) The author with the test glider and various test wings mentioned herein. (Center) Test glider closeup. (Bottom) Finished gas job.

perimental facts. Six wings, with entirely "different *looking*" airfoil sections, but of approximately similar *thickness,* had all shown approximately the same sinking speed when tested on a stick-type glider of low air resistance. When the best of these sections was tested on one gas model against a new thin section, the thin one was superior. When the test was repeated on another gas model, the results were reversed.

A careful examination of the early *Interceptor* G-7 wing used in the original thin-versus-thick wing test later revealed that the wing ribs had warped (because the spars were inserted from the bottom), increasing the camber. The section was now 9% thick instead of 7.7%, and had about 3/32" undercamber instead of a flat bottom.

Study of these facts indicated some interesting and important conclusions which point the way to a new basis for choosing the wing section for a particular endurance model. The idea is simply that, for maximum performance, *the thickness of the section is governed by the drag of the rest of the ship.*

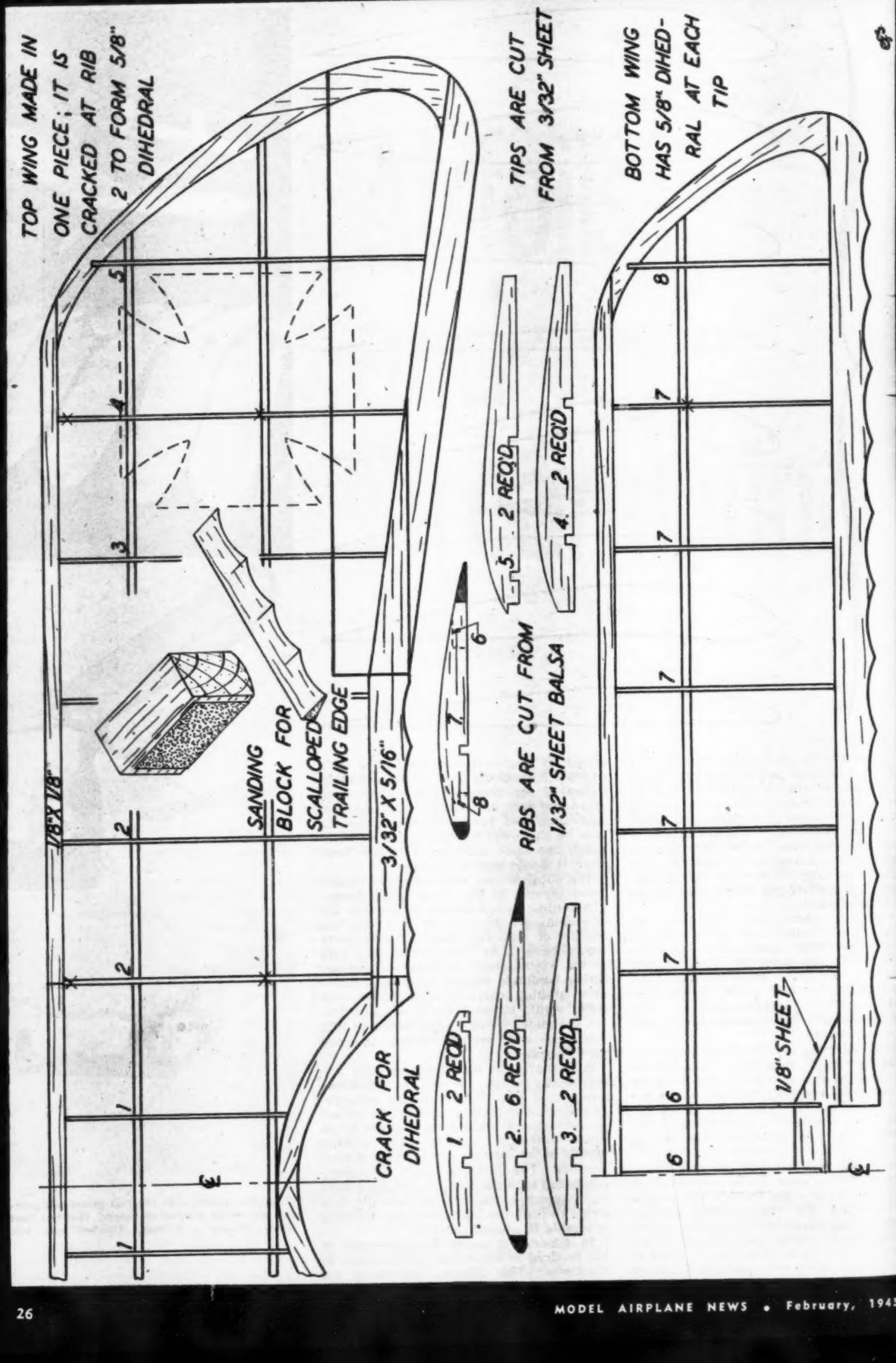
Let's take this ordinary example. Suppose you have been flying a ship which performs well, even though the engine isn't cowled, the two-wheeled landing gear has big air-wheels, and the sporty looking cabin pushes great masses of air aside on each flight. The chances are that your wing section is of medium thickness —11% to 13% (around 1/8 to 1/9) of the chord. If you were to substitute a wing of 7% thickness the glide would definitely suffer; if the climb normally had been steep and fast, it would be still faster; if the climb had been moderate it would now be shallower but faster and so might reach the same altitude; if it had been poor, it would now be worse.

But suppose you built a really streamlined version of the same basic design. (Definition: streamlining is not the art of putting graceful curves on a ship, but the art of reducing drag.) The stability would have to be increased to take care of the extra speed. A neat, slim, close-fitting complete engine cowling, retractable landing gear, and slim fighter-type cabin would improve the climb and flatten the glide. Using a wing of 9% to 10% thickness now would further improve performance.

Apparently, at model speeds and adjustments, wings of similar thickness when used on a glider will give approximately similar sinking speeds. As shown in the armory gliding tests, there is no great difference between the sinking speeds of flat-bottom and undercambered sections. The *forward* speed of undercambered sections is slower, which makes them *appear to sink* slower. Actually, this tends to hurt the climb because the ship is unable to ascend quickly.

In general, it seems that the ratio of lift to drag is somewhat proportional to thickness. The thinner the wing the

(Turn to page 54)



TOP WING MADE IN ONE PIECE; IT IS CRACKED AT RIB 2 TO FORM 5/8" DIHEDRAL
TIPS ARE CUT FROM 3/32" SHEET
BOTTOM WING HAS 5/8" DIHEDRAL AT EACH TIP
1/8" X 1/8"
SANDING BLOCK FOR SCALLOPED TRAILING EDGE
3/32" X 5/16"
CRACK FOR DIHEDRAL
RIBS ARE CUT FROM 1/32" SHEET BALSA
1. 2 REQ'D
2. 6 REQ'D
3. 2 REQ'D
4. 2 REQ'D
5. 2 REQ'D
1/8" SHEET

Albatros D.V

In other days German fighter planes plagued Allied pilots over the Western Front. Here's a model of one of their best

PRIOR to the outbreak of World War I much discussion was rampant as to the military value of aircraft. Obvious as it may now appear in the light of subsequent events, few foresaw the amazing development of air power or the neck-to-neck race for air supremacy that was to start in 1914 and extend through two bitter wars.

In the first war no overwhelming advantage was ever attained by either side through progress of design or production. If at any time a machine of exceptionally high performance appeared, it was not long before the other side copied and improved on its best features. This holds true even today, for while the Luftwaffe has been dealt a severe lashing, largely through numerical superiority of the Allies, no one who has met their aircraft in combat will concede that they are possessed of inferior fighting capabilities.

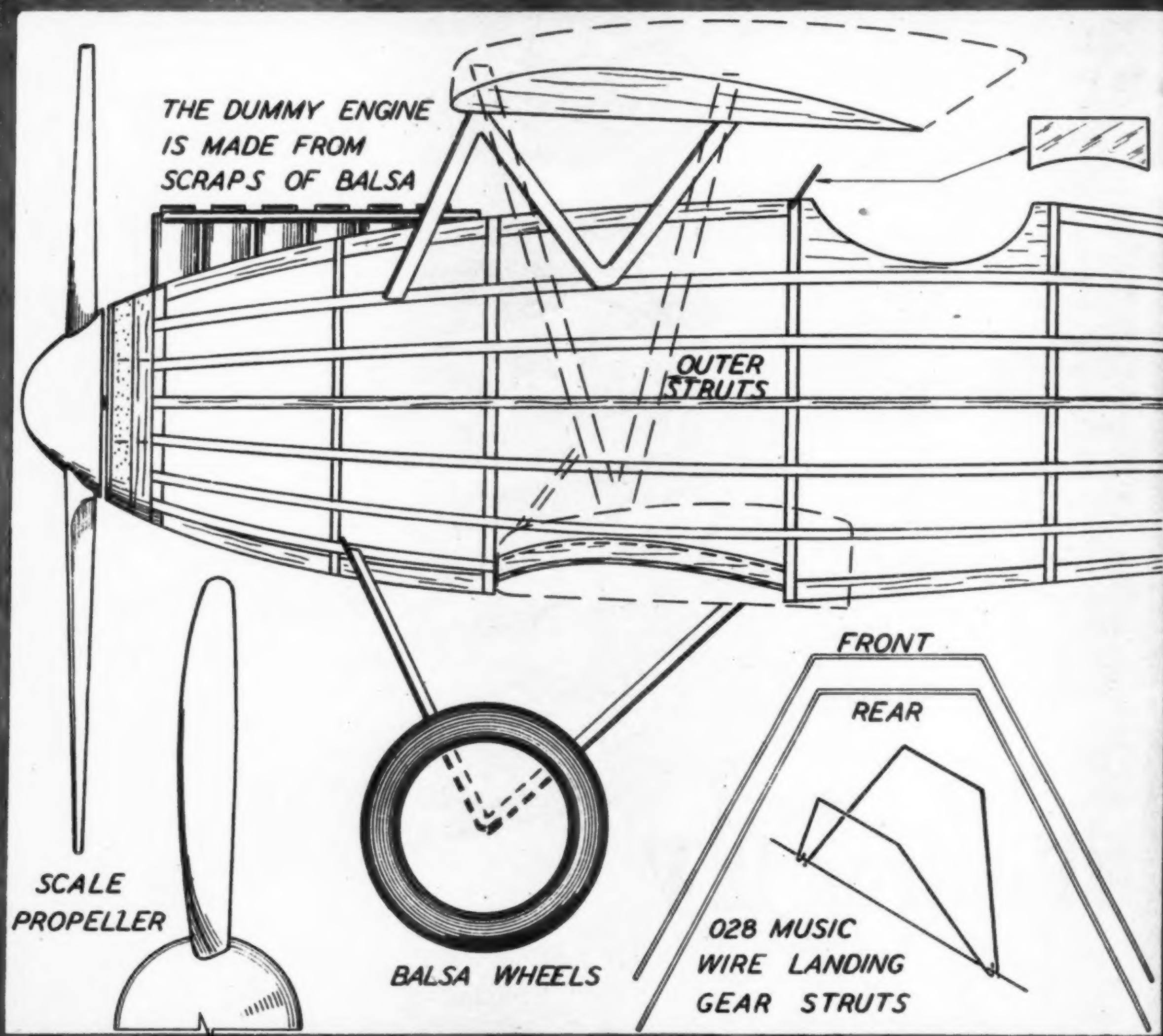
Today's Messerschmitts and Focke-Wulfs, outstanding fighters of the Luftwaffe, have their counterparts in the notorious Fokkers and Albatroses of the German Imperial Air Corps of the first World War. During the early part of the struggle little was heard of Albatros planes, but in 1916 their fast, shark-like bodied fighters made their appearance and amassed considerable destruction on Allied air power. It was in an Albatros that Germany's top ace, Baron von Richthofen, scored most of his 80 confirmed victories.

Perhaps the best known of the Albatros scouts was the D-3 of 1916-17 and the later model D-5. The D-5 had a 225 hp water-cooled Mercedes engine and a speed of 140 mph was credited to it. This was remarkable speed for a fighter of that day and somewhat alleviated the plane's disadvantage of reduced maneuverability caused by its considerable weight. The operating ceiling was more than 18,000 ft. and it could attain the first 10,000 ft. of altitude in 13 minutes. Useful load of the craft was 517 pounds.

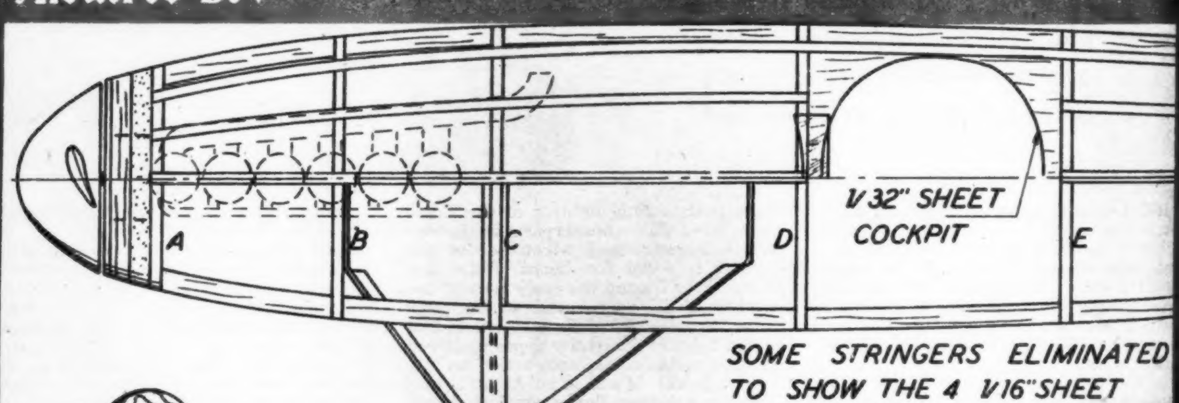
Most unique feature of the ship was the advanced aero-dynamic and structural characteristics of the fuselage. Sleek and shaped like a fat cigar, the body was of three-ply wood construction. Except for the exposed cylinders of the engine, this presented clean, unbroken lines to the slipstream and undoubtedly contributed to the overall efficiency of the craft. Wing and empennage were of conventional wood and cloth construction. Wingspan was 29 ft. 8 in., and length of the plane 24 ft.

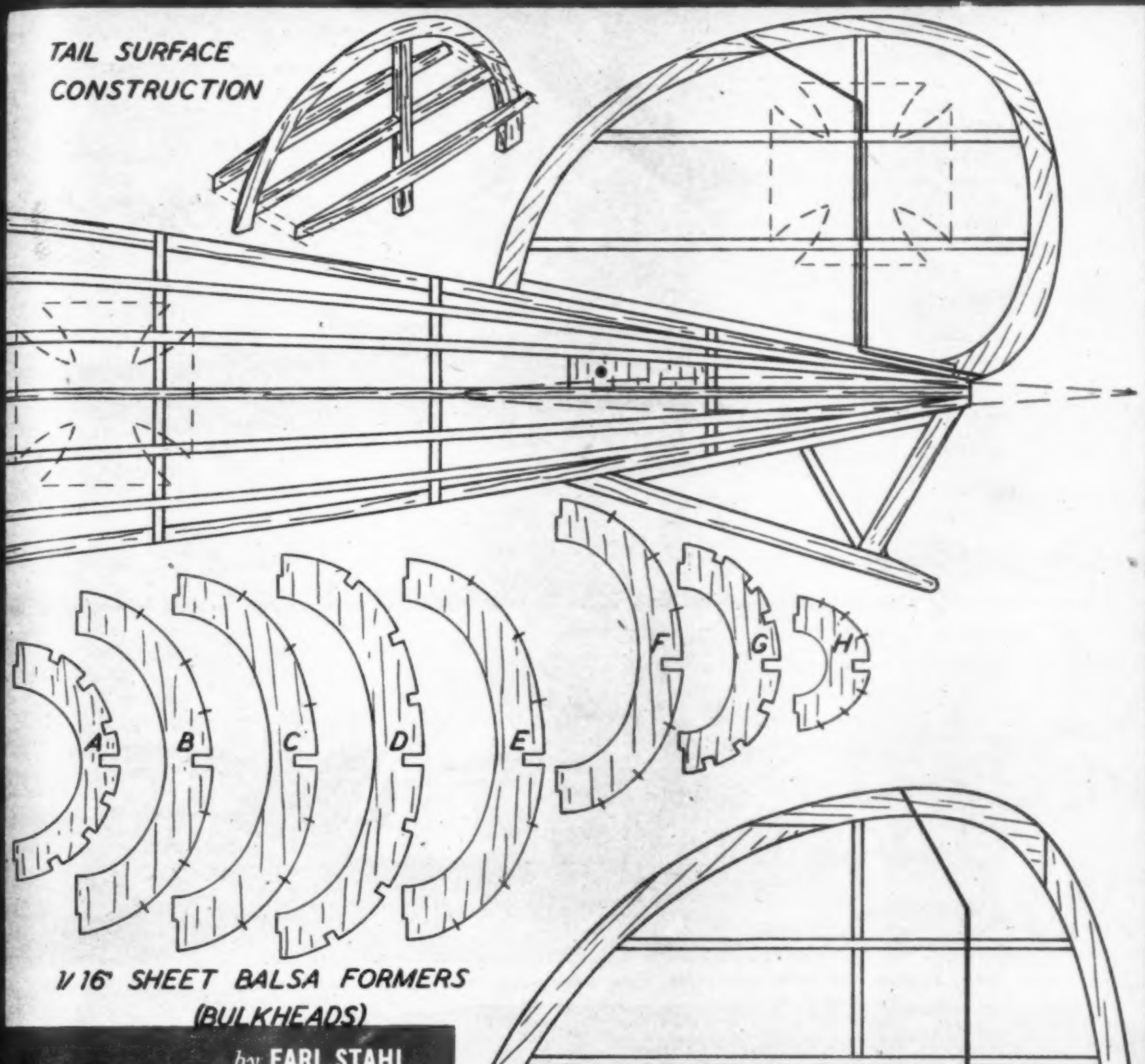
In remarkable contrast to the withering volume of fire-power spewed from the eight-gunned P-47's, or cannon and rocket-firing Typhoons of this war, the Albatros mounted two Spandau guns of small bore synchronized to fire through the whirling propeller blades. Likewise

(Continued on page 45)


THE DUMMY ENGINE
IS MADE FROM
SCRAPS OF BALSA
OUTER
STRUTS
FRONT
REAR
SCALE
PROPELLER
BALSA WHEELS
028 MUSIC
WIRE LANDING
GEAR STRUTS

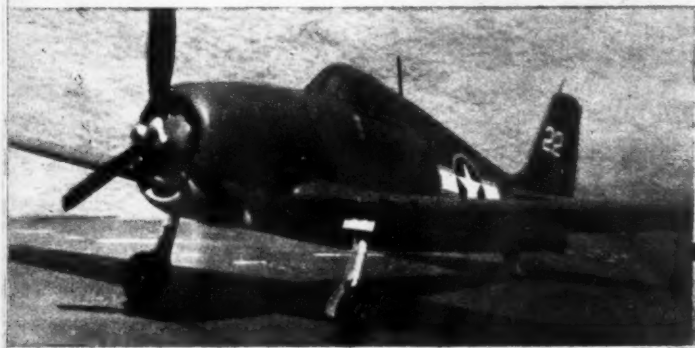
Albatros D.V

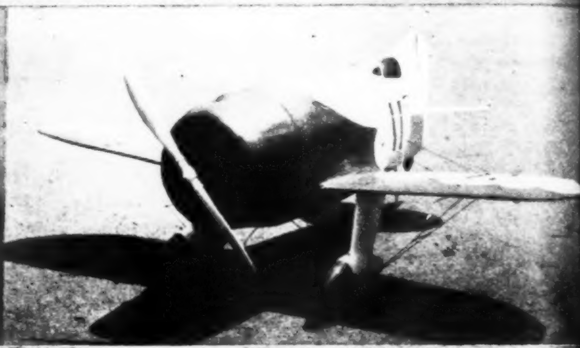

A
B
C
D
E
1/32" SHEET
COCKPIT
SOME STRINGERS ELIMINATED
TO SHOW THE 4 1/16" SHEET
KEELS
NOSE PLUG
1-1/4"
3/4"
3/8"
4 @ 1 1/2" = 6"
BLANK FOR
FLYING MODEL PROP
efs



by EARL STAHL

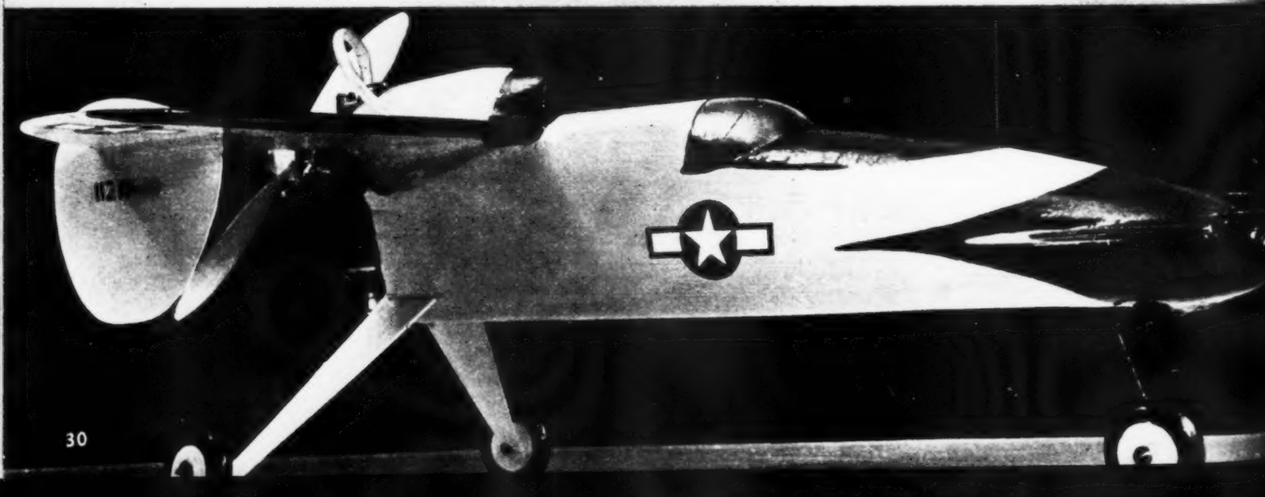
No. 1 Cliff McBaine spent 3 months making this Ryan ST-M model the exact duplicate of its big brother including all interior details





No. 2 J. C. Yates, Jr., built this detail scale *Hellcat* from flying model. No. 3 Gee Bee detail scale by Dick Campbell is realistic

No. 4 Bill Steeneck, oldtimer, put his own ideas in this Vought *Corsair*. No. 5 Bob Hildebrand designed this Class A for climb. No. 6 (below) Originality prize goes to J. Westall, Canuck builder for this snappy control line job



AIR WAYS

MODEL builders are of two classes—those who *do* their best work today; and those who *promise to do* their best tomorrow and forget about it. Which group do you belong to? We don't know about individual cases but can assume from our response in *Air Ways* that the general trend is toward the former. It is indeed gratifying to receive pictures of so many worthwhile models with such excellent photographic details. However, we are greedy and want even more, knowing that you will "come across."

Any boy can build model airplanes, the trick is to build good ones. For the novice there is always the kit form. For the experienced modeler with ability and ingenuity, the opportunities for original design and improvement of existing designs is limitless, having a scope that is breathtaking to visualize. However, we may really will to perform a certain action, or we may merely wish to do so—this wish being a little more than desire. A wish may exist without giving rise to the will to carry it out. Wish and desire remain in the world of inaction, hence the truth of the adage: "If wishes were horses, beggars would ride." The reason they do not ride is the fact that the wish is never converted into action. So regardless of how weird or impossible your model building wish may be, carry it through to a finish (bitter or otherwise).

It is necessary that the model photo you submit for publication be as near perfect as possible; but if it's a good ship and a good photograph, we'll print it . . . if it isn't we'll tell you what is wrong. Then the next plane you build will be that much nearer the perfect goal you have in mind.

Model building accomplishes many purposes—(parents please note)—It keeps you home and that isn't a bad place to be during these long winter months. Regardless of the advantages obtained from your local model building club your most constructive work is that accomplished by yourself in the privacy of your own workroom. That is where you dream up those desires you are going to put into application, and that is where those desires are eventually going to materialize. Another advantage is the association with other clean-cut lads who are interested in the same things you are. They too have constructive ideas, and by pooling your resources great things can be developed. Some of the friendships so made are life-long and will give great solace in the years to come. Also, your competitive instincts are aroused. You are going to build a better model than Johnny Jones next door and boy, oh boy, you're going to show him at the next airplane meet. Of course there is always the possibility that maybe Johnny's ship will place first, and in that event you have to redouble your efforts in order to prevent

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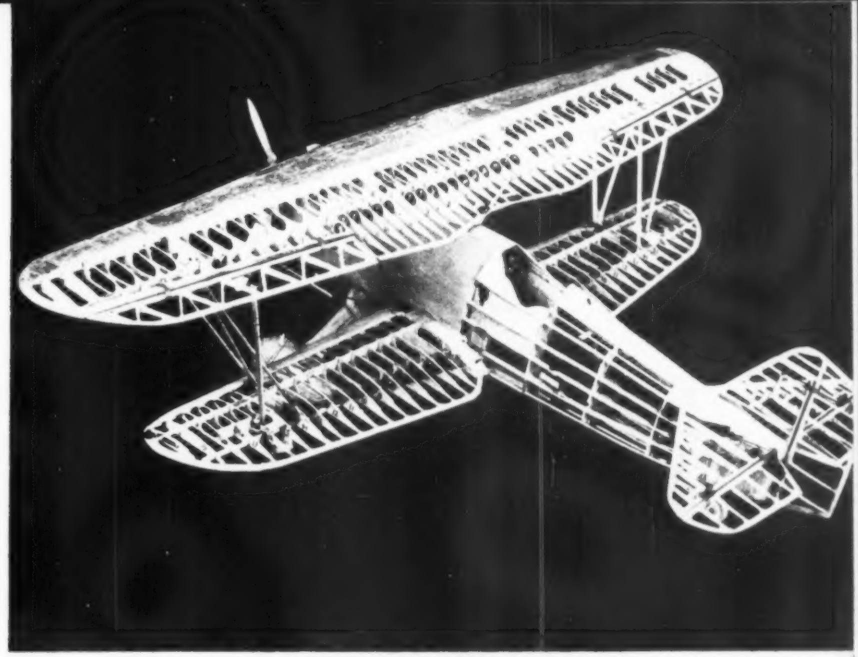
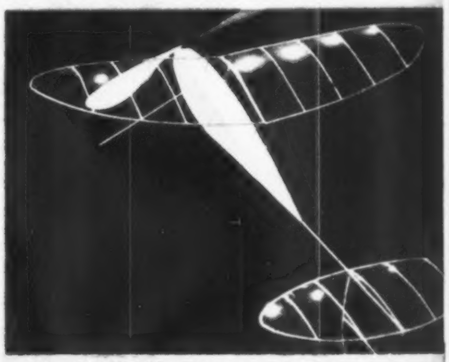


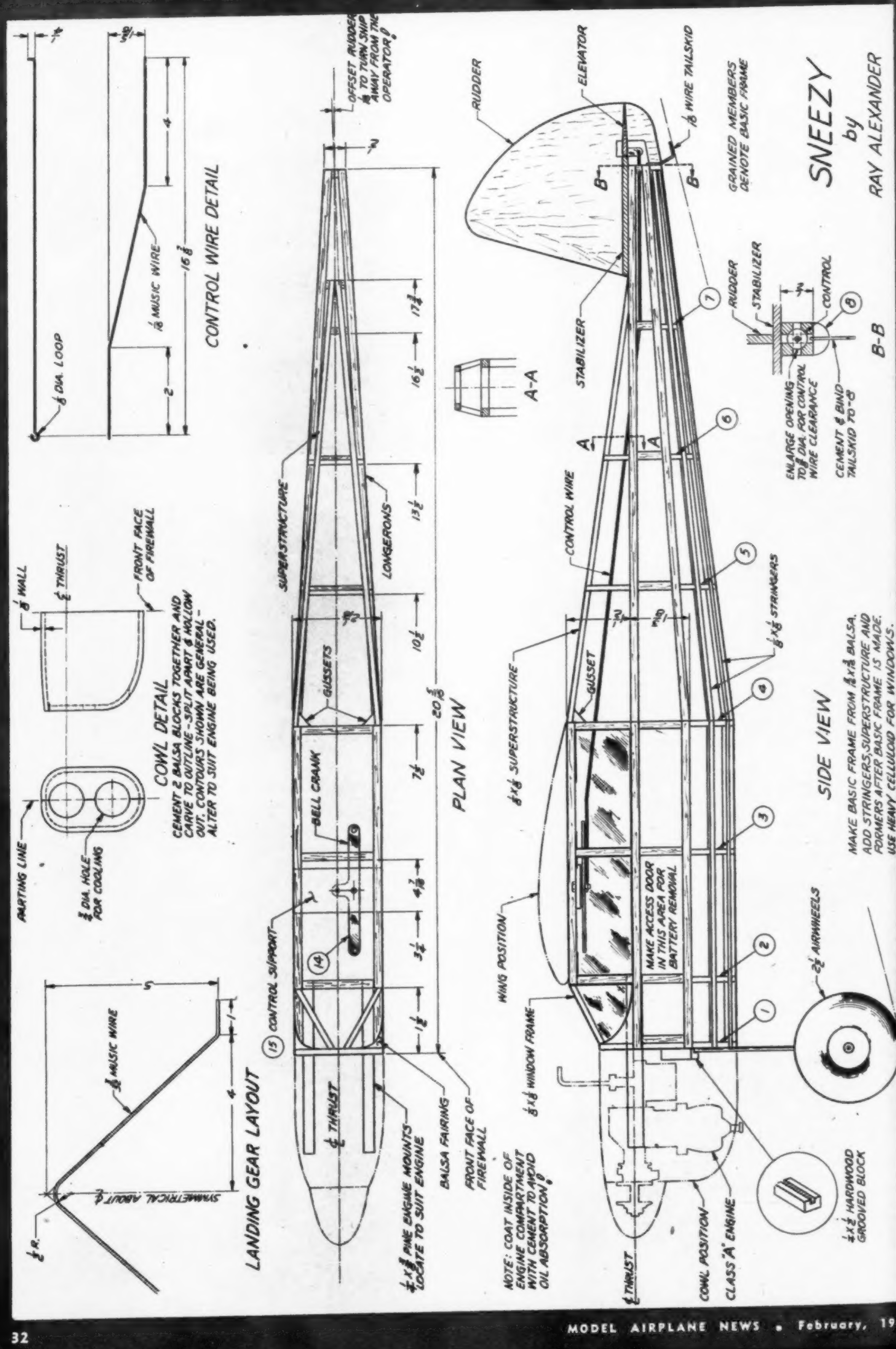
No. 7 Here's perfection in an old favorite, a Curtiss *Hawk* P-6E by John Flynn

No. 8 *Avenger* is fine work of Bill Noonan. No. 9 (below) Dan Heald's indoor model



No. 10 (left) Hugo Pessina and glider

No. 11 (below) Bob Hinkle's *Thunderbolt*



SNEEZY
by
RAY ALEXANDER
SIDE VIEW
MAKE BASIC FRAME FROM 1/8 x 1/8 BALSA. ADD STRINGERS, SUPERSTRUCTURE AND FORMERS AFTER BASIC FRAME IS MADE. USE HEAVY CELLULOID FOR WINDOWS.
GRAINED MEMBERS DENOTE BASIC FRAME
PLAN VIEW
CONTROL WIRE DETAIL
COWL DETAIL
CEMENT 2 BALSA BLOCKS TOGETHER AND CARVE TO OUTLINE - SPLIT APART & HOLLOW OUT. CONTOURS SHOWN ARE GENERAL - ALTER TO SUIT ENGINE BEING USED.
LANDING GEAR LAYOUT
SYMMETRICAL ABOUT ℄
RUDDER
ELEVATOR
STABILIZER
1/16 WIRE TAILSKID
OFFSET RUDDER 1/8 TO TURN SHIP AWAY FROM THE OPERATOR
CONTROL WIRE
SUPERSTRUCTURE
1/8 x 1/8 SUPERSTRUCTURE
GUSSET
GUSSETS
LONGERONS
BELL CRANK
CONTROL SUPPORT
1/8 x 1/8 STRINGERS
MAKE ACCESS DOOR IN THIS AREA FOR BATTERY REMOVAL
WING POSITION
1/8 x 1/8 WINDOW FRAME
2 1/2 AIRWHEELS
1/4 x 1/2 HARDWOOD GROOVED BLOCK
CLASS "A" ENGINE
COWL POSITION
℄ THRUST
NOTE: COAT INSIDE OF ENGINE COMPARTMENT WITH CEMENT TO AVOID OIL ABSORPTION!
1/4 x 3/8 PINE ENGINE MOUNTS LOCATE TO SUIT ENGINE
BALSA FAIRING
FRONT FACE OF FIREWALL
PARTING LINE
3/4 DIA. HOLE FOR COOLING
1/8 WALL
1/8 DIA. LOOP
1/16 MUSIC WIRE
3/32 MUSIC WIRE
A-A
B-B
ENLARGE OPENING TO 1/8 DIA. FOR CONTROL WIRE CLEARANCE
CEMENT & BIND TAILSKID TO 8
CONTROL
20 3/8

FORMERS AFTER BASIC FRAME IS MADE.
USE HEAVY CELLULOID FOR WINDOWS.
B-B
RAY ALEXANDER
1945

USE HEAVY CELLULOID FOR WINDOWS. B-B RAY ALEXANDER

'SNEEZY'

by **RAY ALEXANDER**

To break in to control line flying, break out with this utility liner and learn the tricks

SNEEZY is for the fellows who want a control ship that flies like a real airplane and yet doesn't look like a "goat" or a wingless motor. The design was carefully worked out and tested over a period of six months. The ship does about 40 mph. under power and is responsive but not jumpy on the controls. The original ship was powered by a *Little Dynamite*, but any class B or small class C motor will work just as well.

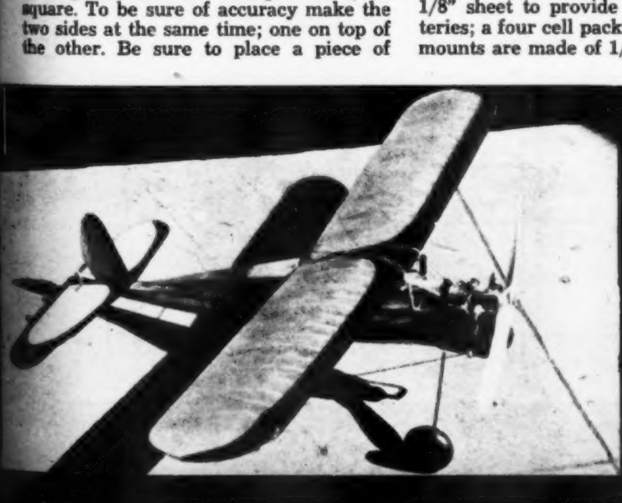
FUSELAGE—The fuselage is constructed in the conventional manner of making two sides from the plans of 5/32" square. To be sure of accuracy make the two sides at the same time; one on top of the other. Be sure to place a piece of waxpaper between them to keep them from sticking together. While the sides are drying, cut the firewall from 1/8" plywood. Cement the sides in position on the firewall and join them in position at the tail. Cement the crosspieces in place. Cut the bottom formers from 1/8" sheet and cement them in place. Add the 1/8" stringers and let dry thoroughly.

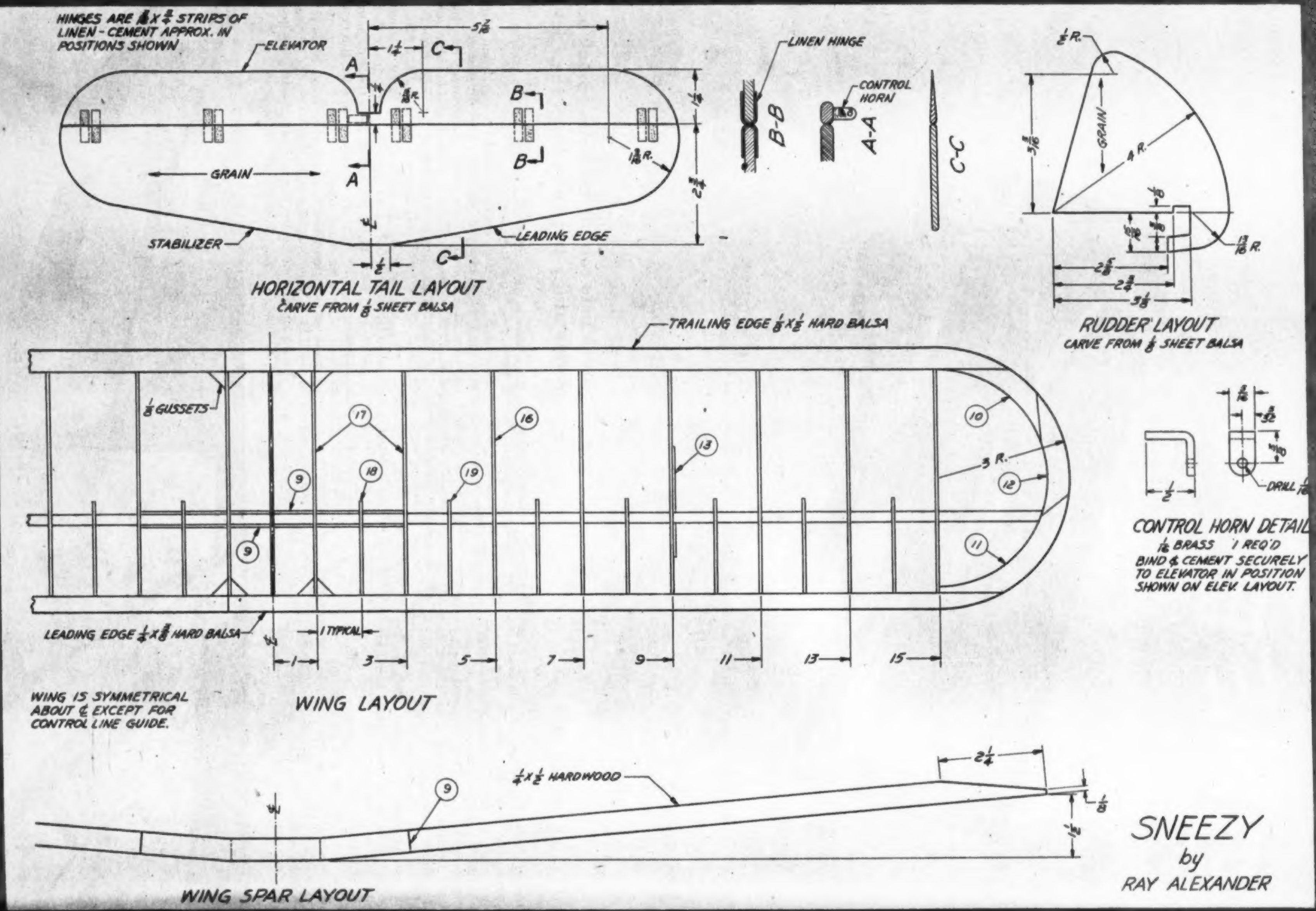
The top of the fuselage is completed by glueing 1/8" square stringers at each end of the cabin and bringing them together at the leading edge of the stabilizer. A hatch just below the cabin is made of 1/8" sheet to provide access to the batteries; a four cell pack is used. The motor mounts are made of 1/4" x 1/2" x 9" oak or hardwood and are glued in position in the fuselage.

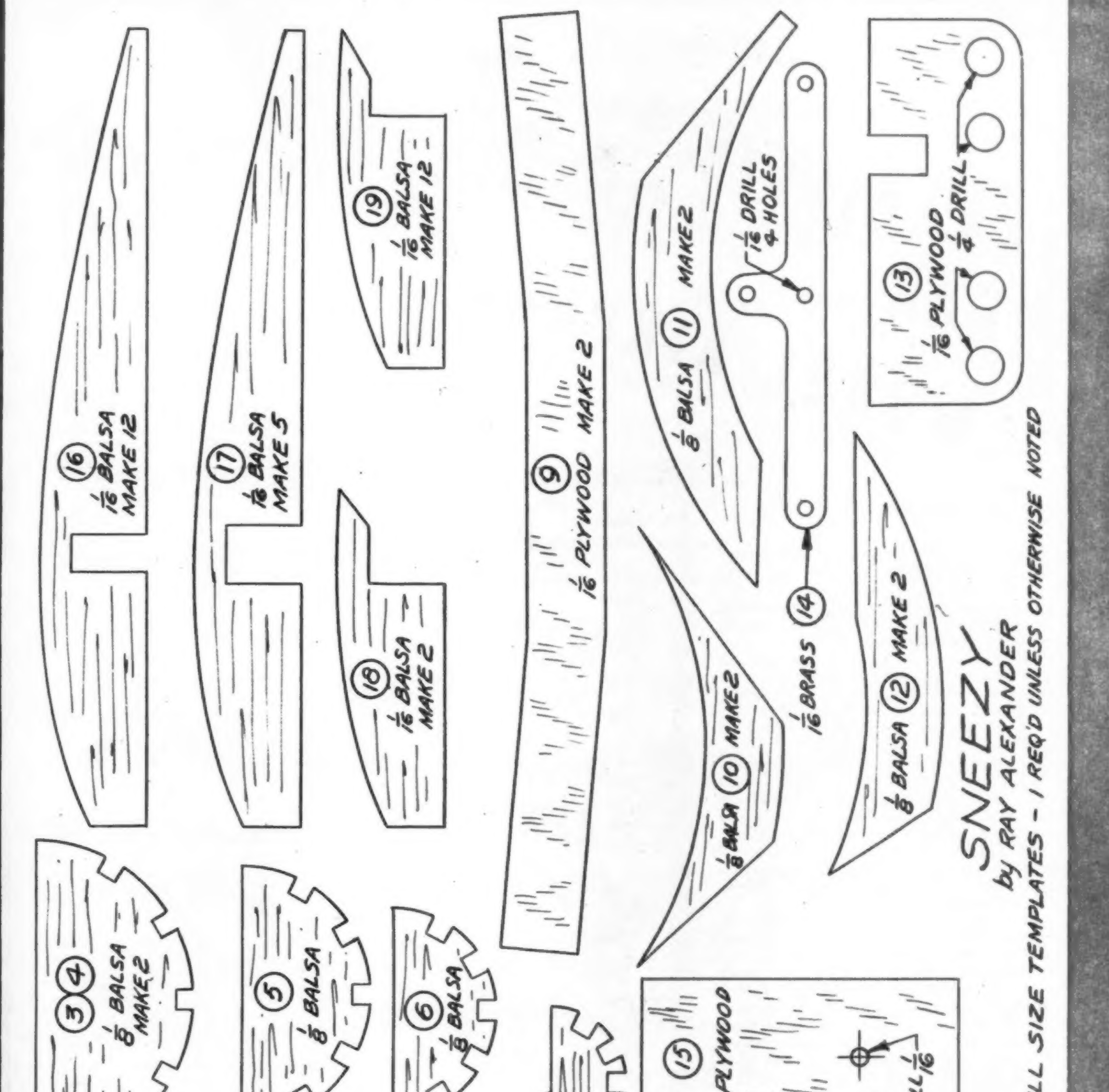
The walking beam is cut from 1/16" aluminum or brass as illustrated and bolted to the piece of plywood that has been cemented to the fuselage cabin roof as shown with a 6-32 bolt. Be sure this turns freely and will not jam. The elevator horn is made of the same material and bolted to the elevator with a 3-48 bolt. These are joined by a piece of piano wire 1/16" in diameter. Be sure the controls move freely.

Bend the landing gear from 3/32" diameter piano wire, following the dimensions on the plans. Make the landing gear

(Continued on page 40)




HINGES ARE 1/8 X 3/4 STRIPS OF LINEN - CEMENT APPROX. IN POSITIONS SHOWN
ELEVATOR
GRAIN
STABILIZER
LEADING EDGE
HORIZONTAL TAIL LAYOUT
CARVE FROM 1/8 SHEET BALSA
LINEN HINGE
B-B
CONTROL HORN
A-A
C-C
GRAIN
RUDDER LAYOUT
CARVE FROM 1/8 SHEET BALSA
TRAILING EDGE 1/8 X 1/2 HARD BALSA
1/8 GUSSETS
LEADING EDGE 1/4 X 3/8 HARD BALSA
1 TYPICAL
WING IS SYMMETRICAL ABOUT ℄ EXCEPT FOR CONTROL LINE GUIDE.
WING LAYOUT
CONTROL HORN DETAIL
1/16 BRASS 1 REQ'D
BIND & CEMENT SECURELY TO ELEVATOR IN POSITION SHOWN ON ELEV. LAYOUT.
DRILL 1/16
1/4 X 1/2 HARDWOOD
WING SPAR LAYOUT
SNEEZY
by
RAY ALEXANDER


SNEEZY
by RAY ALEXANDER
FULL SIZE TEMPLATES - 1 REQ'D UNLESS OTHERWISE NOTED
1 1/8 PLYWOOD
1/8 BALSA
2 1/8 PLYWOOD
1/8 BALSA 8
3 4 1/8 BALSA MAKE 2
5 1/8 BALSA
6 1/8 BALSA
7
15 1/8 PLYWOOD
DRILL 1/16
16 1/16 BALSA MAKE 12
17 1/16 BALSA MAKE 5
18 1/16 BALSA MAKE 2
19 1/16 BALSA MAKE 12
9 1/16 PLYWOOD MAKE 2
1/8 BALSA 10 MAKE 2
1/8 BALSA 11 MAKE 2
1/16 BRASS 14
1/16 DRILL 4 HOLES
1/8 BALSA 12 MAKE 2
13 1/16 PLYWOOD
1/4 DRILL

STABILITY FOR MODEL AIRPLANES

by **W. H. KORFF**

DURING a two year period the writer designed and tested over 125 combinations of wing, tail, fuselage, etc. The results of these experiments were tabulated in a little brown book for future use in developing new models.

The high percentage of "crack-ups" at gas meets all over the country is ample proof that stability is still a real problem, therefore I believe that "notes from this little brown book" will be of value to many modelers.

The finest workmanship and the most efficient design is worthless if a model isn't stable. After the ship is in the air the most skillful builder-flier can do nothing to give it the needed stability; it has to be in-built. Who hasn't seen a model climb up to a stall, drop off on a wing, then crack-up? Several things were responsible.

First, the line of thrust was too low, causing the model to stick its nose upward to stall—even though the engine was running wide open. The next fault is in the wings; one of the tips stalled before the center section causing the ship to drop off into a spin. Another fault may have been the twisting slipstream on the rudder; this causes the ship to turn unless the rudder is turned the correct amount to neutralize it. These various problems and the ways of solving them will now be discussed.

About a year ago tests were run to determine how high the line of thrust must be in order to give high climb with lots of forward speed to avoid the stall. The model was of standard design, high wing, 3 lbs. in weight, Brown-powered. The engine was mounted on long bolts so that the bolts would serve as "stilts" by using a nut underneath and above the engine lugs. The engine was moved upward progressively until it was about 2-1/2" above the usual location; this put the line of thrust approximately 3/4" above the top of the wing at the fuselage. This seemed so unusual that it was decided to build a new model, a low wing, to utilize the new engine location to the best advantage.

The model fulfilled all expectations. When the engine stopped the forward speed was sufficient to immediately start

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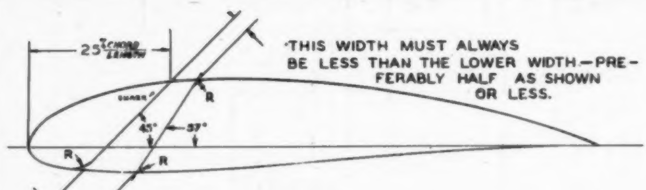


FIGURE 1—TYPICAL SLOT DESIGN

THE MOST IMPORTANT FEATURES ARE TO MAKE THE UPPER OPENING CONSIDERABLY SMALLER THAN THE LOWER AND TO MAKE THE FRONT UPPER CORNER SHARP. OTHER FEATURES MAY BE ALTERED SLIGHTLY.

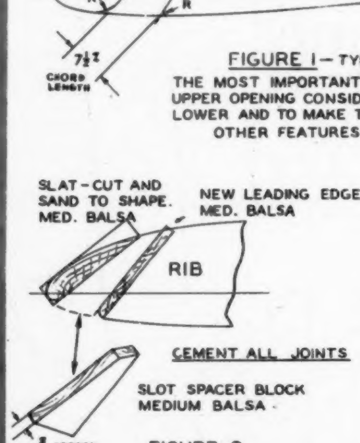


FIGURE 2

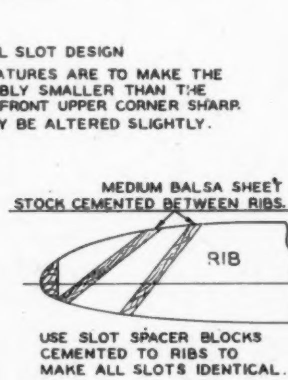


FIGURE 3

HOW TO INSTALL SLOTS ON WINGS ALREADY BUILT—THIS DESIGN IS EASIER AND IS PREFERRED TO FIG.2 SLOTS SHOULD EXTEND BETWEEN THE RIBS FOR AT LEAST TWO RIB SPACINGS.

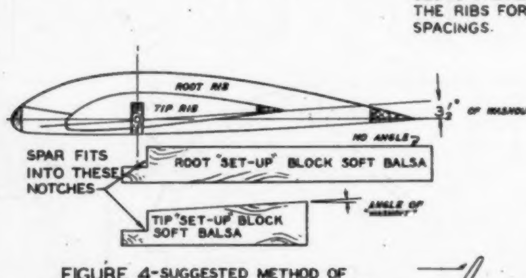
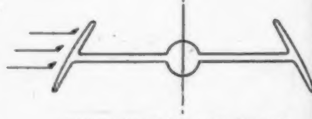


FIGURE 4-SUGGESTED METHOD OF BUILDING A WING WITH "WASHOUT"—NOTE THAT RIBS ARE CUT TO FIT SPAR THAT IS NOT TWISTED.



TWIN RUDDERS SET AT AN ANGLE—THE AIRFOIL OR OUTSIDE RUDDER IN A FAST TURN TENDS TO PUSH THE TAIL DOWN, INCREASING LIFT AND AVOIDING SPIRALS

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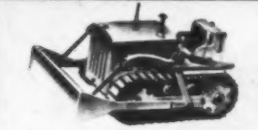
CAVACRAFT P-38

Precision Scale Model Swing Control Lockheed P-38 Lightning

Ready to fly; completely finished and painted. A thrilling, speedy performer! Tricycle Landing Gear.......$1.75
Add 15c Parcel Post

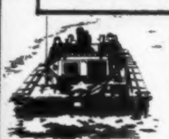
ROBOT BOMB

Two-way cut, all balsa kit. Includes lathe-turned parts for desk stand. 6½" long. Add 10c P. P. 40c



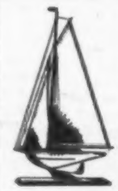
BULLDOZER

Here's the mighty machine that builds the fighting nests for America's biggest birds! Super-solid kit, pre-shaped parts, ready to assemble and finish. Thrilling detail. Accurate scale $1.25
Add 10c Parcel Post



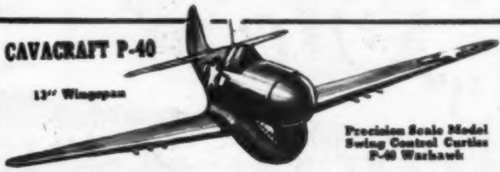
BRAND NEW! MODEL ALLIGATOR Amphibian Tank

Everything is cut . . . and everything is included in this exciting new model kit. Makes faithful scale model of this important military machine.................$1.25
Add 20c Parcel Post



SLOOP VENTURA

Another completely finished model masterpiece. Ideal for your room, den, fireplace mantel, desk and many other spots. Beautifully finished and rigged with sails, mounted on stand as illustrated.
Postpaid $4.95



CAVACRAFT P-40

13" Wingspan

Precision Scale Model Swing Control Curtiss P-40 Warhawk

Ready to fly; completely finished and painted. A real thriller for speed and maneuverability!..............Add 15c Parcel Post $1.75

TAYLORCRAFT
10 BIG FLYERS 65¢ each

TAYLORCRAFT	30"	WARHAWK	30"
DEVASTATOR	30"	VO. CORSAIR	30"
MUSTANG	30"	SPITFIRE	30"
WILDCAT	27"	LIGHTNING	26"
PIPER CUB	30"	FAIRCHILD	30"

ARMY TRUCK & TRAILER

2½ and 1½ ton trucks. Precision cut parts; super detail.

Trailer	Trucks
60c	$1.00 Ea.
Add 10c P.P.	Add 15c P.P.

X-ACTO KNIVES

No. 83 De Luxe all metal X-Acto knife chest..$7.00
No. 82 X-Acto knife chest 3 X-Acto knife handles 12 ass't'd. blades..........$3.00
No. 62 X-Acto double knife set 2 knives and 10 ass't'd. blades..........$2.00
No. 52 X-Acto Set with No. 2 Knife and 5 ass't'd. Large Blades..........$1.00
No. 51 X-Acto Set with No. 1 Knife and 5 ass't'd. Small Blades..........$1.00

CLEVELAND'S 36" NORTHROP P-61 "BLACK WIDOW" $1.50

SUPER GLIDERS

THERMIC ALL BALSA

Fun to build. Sure to fly. Tops for beginners.
Thermic 18"..........20c
Thermic 20"..........35c

THERMIC DE-LUXE

For glider fans who are after gliding records and love to build 'em right.
Thermic 50"..........$1.00
Thermic 72"..........$3.00

COMMANDO GLIDER WITH JEEP

A flying counterpart of the gliders that carry them behind the enemy lines. Complete kit . . . glider and jeep..........$1.00

SCHWEIZER TG-2

Towline model of famous Marine Corps Glider. Removable cockpit. Controls adjustable from cabin.......... 50c

FAMOUS "PLAYBOY" SERIES

Playboy Senior.....$4.50
GP-5017 for class "C"
Playboy Junior.....$2.00
GP-5006 for class "B"
Less power unit and hdwe.

"MUSTS" FOR MILITARY MODEL BUILDERS

Westcraft Jeep	$ .29
Redi-Cut Anti Tank Gun	.40
Redi-Cut Truck Trailer	.40
Redi-Cut Jeep	.60
Austin Jeep	.75
Modac Amphibian Jeep	.75
Ace Truck	1.00
Redi-Cut Jeep Gun Combo	1.00
Auler Jeep	1.25
Austin Truck	1.25
Modac Scout Car	1.50
Modac Half Track	1.50

¼" "REDI-CARVED" FUSELAGE KITS

De-luxe miniatures. Generously filled kits.

Focke Wulf $1.25
Curtiss P-40 $1.25
Thunderbolt $1.25
Mustang $1.25
Hell Cat $1.25
Lockheed Lightning $2.00

First Model To Fly By Jet Propulsion RAY ROCKET JP-1 $1.35

Launching Gun.......$1.00
1 doz. Rocket Units....$1.20

Streaks through the air streaming a vapor trail behind it! You can hear and see science's sensational discovery in action! Easy to build—no propeller to carve, no rubber motor, no gasoline engine. Easy to fly—no propeller torque to upset stability. Launched by a gun that releases carbon-dioxide in the "rocket unit." Harmless, no fire hazard. (Patent Pending.) Launching gun and additional "rocket units" sold separately. Immelman turns! Vertical climbs! Loops!

"ACE" M-4 TANK

Super detail kit. All parts pre-carved and shaped... Giant size model..$2.50
Add 25c P.P.

25c COMET SPEEDOMATICS

Speedomatic is the most talked-about method of model airplane construction. Revolutionary in method and results. Builds 'em faster and better.

Tiger Shark P-40 — Thunderbolt
Mitsubishi Zero — Focke-Wulf, Fw-190
Mustang P-51

50c COMET SPEEDOMATICS

Douglas Dauntless — Vought Corsair
Supermarine Spitfire — Stormovic
Grumman Avenger — Vultee Vengeance

GAS MODELS

America's Finest Proven Flyers

Jiffy $1.50 — Rocketeer A $2.95
Roamer $2.95 — Javelin $3.95
American Ace $3.95
American Ace 36 $1.50
Pacer B or C $3.95 — Pacer C $4.95
Playboy Jr. $2.50 — Playboy Sr. $4.50
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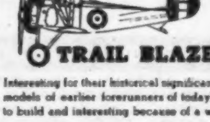
Buccaneer $1.50 — Skyrocket $2.25
Musketeer 42 $2.50 — The Bee $1.95
Super Buccaneer $8.50 — Yogi $3.95

BURKHART FLOATS

Class "B"..........$2.50

Testor Flying Fortress $1.00



35c EACH TRAIL BLAZERS

Interesting for their historical significance. These Maircraft models of earlier forerunners of today's fighters are easy to build and interesting because of a wealth of detail.

Seversky P-35	Fokker D7	Boeing P26 A
Vultee Vanguard	Fokker D8	Hawk P6E
Boeing F4B4	SE 5 Pursuit	Spad 13
Curtiss Goshawk	Monocoupe	Nieuport 17
	Sopwith Camel	

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AMERICA'S GREAT HOBBY AND MODEL FAIR

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MEN W WINGS

By Russell J. Robinson

EARLY EXPERIMENTS

A YORKSHIRE Englishman, Sir George Cayley, has been credited with the invention of the airplane.

Sir George described his plane in "Nicholson's Journal" in 1809. In his published article he wrote of the screw propeller, air displacement, the form of wings and empennage. He also described an idea for accomplishment of stability by automatic means.

Cayley produced a machine following these lines in 1810. His first model was motorless but eventually he produced a motorized model. This latter machine, however, was not successful. Sir George proposed the use of fixed wings rather than the flapping type which were used on practically all machines constructed at that time. He believed too that man-power would have to be replaced by motor power of some kind. Cayley felt that steam would not do and suggested using the internal combustion engine then being developed. Cayley later built a glider and a model machine which he attempted to fly by means of compressed air.

More than thirty years rolled by. Then, in 1840, an experimenter named Henson constructed several small-scale gliders. Henson's gliders were powered by steam! His success with these inspired him to attempt construction of a machine capable of carrying passengers. His machine, "The Ariel," was huge and similar to the modern airplane in appearance. "The Ariel" was supplied with a steam engine which operated two propellers. There were movable surfaces for the control of direction and elevation. Henson, however, neglected to provide controls for lateral or sidewise movements.

Henson allied himself with one John Stringfellow who financed construction of his machine. When "The Ariel" failed to leave the ground Stringfellow carried on his own experiments. It was he who finally built the *first steam-powered* model capable of consistent flights!

In England, Sir Hiram Maxim built a plane in 1894 whose engine weighed only two pounds per horsepower. Although this power plant helped solve the problem of light-weight motors, Maxim's plane failed to fly successfully. Sir Hiram also experimented with several types of wings and propeller combinations. His plane was built at a cost of $150,000.00. A 360 horsepower steam engine provided the motive power, while the wing area totaled 4000 square feet!

N. Clement Ader of France produced three machines in the period from 1896 to 1903, none of which were very success-

ful. However, Ader's plane was the first to leave the ground under its own power! This plane, also powered by steam, went up at Satory, France in 1896 and flew about 350 *yards!*

The French government in 1897 decided to finance Ader in constructing a machine for military purposes. Although this plane made several successful flights it crashed when demonstrated before government officials. Ader blamed his misfortune on the fact that he had to take off cross-wind, and because of too short a tail-length. This prevented proper control of the craft.

So the beginning of the twentieth century found man apparently baffled in his desire to fly!

'Sneezy'

(Continued from page 33)

clamps of tin or heavy aluminum. Bolt the landing gear to the firewall, using three 4-36 bolts.

After the ignition unit has been installed cover the entire fuselage with Silkspan. Cover only a few inches at a time to get around the compound curves; avoid wrinkling. The original ship was covered with yellow Silkspan and trimmed in black.

TAIL SURFACES—The entire tail unit is made of 1/8" sheet. Lay out the dimensions directly on the wood and cut the surfaces to outline shape. Offset the rudder about 20° so that the ship will tend to fly counter-clockwise (the ship is flown clockwise) so that a constant pull may be obtained on the lines.

Since this is a stunt job, more elevator control than usual is required. The elevators should have 1/2" down and 3/4" up movement. The elevators are attached to the stabilizer by cloth hinges.

When the elevators are attached, the whole tail is given two coats of wood filler and cemented to the fuselage.

WING—The spar is made first. Obtain two pieces of ¼" x ½" x 18" hardwood; taper them at the tips and join them as shown in the plans with the 1/16" plywood dihedral braces.

The wing is built one half at a time. Put the completed spar in place over the plans and place the ribs as shown. The tips are ⅛" sheet. The leading edge is made of ¼" x ⅜" hard balsa. The trailing edge is made of ⅛" x ½" balsa. When the framework is finished, sand lightly and cover with Silkspan. Before the covering is applied be sure the wing guide is cemented firmly in position shown.

FLYING—The finished plane should balance at 40% of the chord from the leading edge. The test flight should be made on about 40 feet of line with the motor open to about three-fourth throttle. Before taking off be sure to check the control movements through the lines. When flying the ship for the first time be sure not to over-control.

When this flight has been successfully completed and the necessary adjustments are made, lengthen the lines to 50 feet, open the throttle, and you will be in for many hours of joyous flying. Good Luck!

BILL OF MATERIALS

1. Ten 5/32 x 5/32 x 36
2. Seven 1/8 square
3. One 1/8 x 4 x 36
4. One 1/4 x 4 x 1/3 plywood
5. One 6 x 6 x 1/16 plywood
6. Two 1/4 x 1/2 x 18 hardwood
7. Two 1/4 x 1/2 x 9 hardwood
8. One 1/4 x 3/8 x 36
9. One 1/8 x 1/2 x 36
10. One 3/32 x 36 piano wire
11. One 1/6 piano wire
12. Two .040 piano wire
13. Two 2-1/2 air wheels
14. 1/8 dia. x 12 dowell
15. 1/16 x 3 x 6 alum. or brass
16. Seven 4-36 bolts

Flash News

(Continued from page 10)

Mead form a new company to develop his ideas on air cooled radial engines.

Early in 1925 Rentschler and Mead resigned from Wright; Lawrance was elected President and served in that capacity until 1930 when he also resigned to form his own company.

Rentschler and Mead established engineering offices in Hartford, Conn., and in less than six months the designs of the new engine, still unnamed, were completed.

The Pratt & Whitney Company is world-famous for half a century as a machine tool manufacturer. When Rentschler and Mead expressed a desire for a small space in which to build their engine, Pratt & Whitney cleaned out an old storeroom to provide the required quarters. Rentschler and Mead hired half a dozen men and set to work building their first engine. Due to the fact that Pratt & Whitney was in the next room, the pair had certain castings, forgings and large machined parts made by them. As was the custom, the casting molds had small forms in them so designed that the firm name was cast into the part, still a common practice. The first engine neared completion with the name "Pratt & Whitney" stamped and formed on the various parts made by that firm.

The engine was completed in the fall of 1925, something of a record for design and production, and passed the rigid U. S. Navy 150-hour test before Christmas. The Navy ordered several of the engines for further tests, and seeing the name "Pratt & Whitney" on the various parts wrote out the contract to the "Pratt & Whitney Aircraft Company." This name is still in use today although there never has been the slightest financial connection between the two firms!

Andrew V. Willgoos was hired as Chief Engineer (a job he still holds), Don Brown was made Factory Manager, and production was started on the second engine, nick-named the "Wasp." The first *Wasp* production model was installed in a new experimental Navy fighter plane, the Wright *Apache*, with a single large float. On July 4, 1927 Lt. C. C. Champion USN went aloft in the *Apache* with the Pratt & Whitney *Wasp* equipped with the first gear-driven blower supercharger and attained an altitude of 37,995 feet to smash the World Record for Altitude for a Seaplane!

The float gear was removed and the conventional wheel landing gear installed on the *Apache*. On July 25, 1927 Lt. Champion attained an altitude of 38,474 feet to break the World Record for Altitude for a Landplane.

So enthused was the Navy Department with the new Pratt & Whitney *Wasp* engine that it was specified as the standard single-seat fighter and two-seat observation plane engine.

The *Wasp* was installed in the new Vought UO-1 *Corsair* two-seat scout plane and more records were smashed. On April 14, 1927 Lt. George R. Henderson flew a *Wasp* powered Vought *Corsair* to an altitude of 22,178 feet with a load of 500 kilograms (1102 lbs.) to set a new World Record. On April 23, 1927 Lt. S. W. Callaway flew a *Wasp* powered *Corsair* over a 100 kilometer (62.14 miles) course with a 500 kilogram load at a speed of 147.263 mph to break another World Record. On April 30, 1927 Lt. J. D. Barner flew a *Wasp* powered *Corsair* over a 500 kilometer (310.7 miles) course with a 500 kilogram load at a speed of 136.023 mph

(Turn to page 44)

Scientific's New, All-Balsa
"SCIENCE-CRAFT" KITS
Reg. U.S. Pat. Off.
with the new, "E-Z" method that makes it as simple as A-B-C to build these models in record time!
Accurately detailed Flying Scale Models of
America's Foremost Fighter Planes
No. Amer. P-51 "MUSTANG" (Shown at left)
$1.25 EACH
Republic P-47 "THUNDERBOLT" (Shown at top)
30" WINGSPAN—PLUS 15c POSTAGE
COMPLETE WITH RUBBER AND CEMENT!
ALL-BALSA GAS-TYPES $1.75 EACH
FLEA 36" Wingspan
MISS AMERICA 40" Wingspan
NEW, ALL-BALSA EASY-TO-BUILD
SUPER FLYERS
25" Wingspan
35¢ EACH
Plus 10c for postage and packing
These new models have been selling like hot-cakes —and no wonder—for they have plenty of class and zip—and their flying ability just can't be beat! See them at your dealers today!
ROYAL
MAJOR
BANTAM
HORNET
WINDSOR
RANGER
GIANT 72" "IMPERIAL" Soaring Glider $1*
*ADD 15c FOR PACKING AND POSTAGE
★ 100% BALSA CONSTRUCTION!
★ New, simplified design makes the "IMPERIAL" extremely easy to build!
★ Has flown over a mile on test flights!
★ Teaches the principles of flight!
Removable cockpit permits easy access to ballast compartment.
DEALERS IN ALL PRINCIPAL CITIES
Top Flight
"GAS MODEL HEADQUARTERS"
Scientific
MODEL AIRPLANE CO.
218-220 M-2 MARKET ST.
NEWARK 2, N. J.

to smash yet another World Record. And on May 21, 1927 Lt. Rutledge Irvine flew a *Wasp* powered *Corsair* seaplane at a speed of 130.932 mph to break another one.

With *six* World Records under its belt, Pratt & Whitney Aircraft Company was "set," and this initial impetus plus unexcelled service and development of new types has maintained their standing among the top aircraft engine firms of the world.

The *Wasp Junior* and the *Hornet* followed in short order, and early in 1929 Pratt & Whitney built the first double row radial air cooled engine, a giant 2300 cubic inch displacement 14 cylinder design. Test stand and flight tests proved the practicability of the type, a private company venture, and in 1930 the famous Pratt & Whitney *Twin Wasp Junior* R-1535 was built and several delivered to the Navy. A slightly larger engine, the R-1830 *Twin Wasp,* was perfected and in 1932 both engines were placed in production for both military and commercial use. The R-2800 was produced in 1939 and is now in quantity production, seeing service in such outstanding airplanes as the Martin B-26 *Marauder,* Vought F4U *Corsair,* Grumman F6F *Hellcat,* Republic P-47 *Thunderbolt,* Northrop P-61 *Black Widow* and many others.

In 1928 several of the leading executives of the American aviation industry began discussions aimed at developing a single large corporation which could make available large sums for the expansion of facilities, experimental research work and the coordination of development programs. William E. Boeing, of the firm bearing his name, was one of the leaders of this group together with Fred Rentschler of Pratt & Whitney, Chance Vought of the firm of that name, and many others. They formed the United Aircraft and Transport Corp. and pooled their various interests. With the assistance of the National City Co. they made available capital with which various aviation projects might be fostered.

By careful purchases they built up one of the largest aviation corporations in the world and in 1930 owned the following firms: Boeing Airplane Co., Boeing Air Transport Inc., The Chance Vought Corp., Hamilton Aero Manufacturing Co., Hamilton Metalplane Co., Pratt & Whitney Aircraft Co., Pacific Air Transport Co., National Air Transport Inc., Stout Airlines Inc., Varney Airline Inc., Stearman Aircraft Co., Sikorsky Aviation Corp., United Airports Inc., and several lesser firms. With this group under a single corporate structure, opportunity was available for the development and expansion of American aviation. The various airlines, carefully selected for the purpose, were joined together into United Airlines Inc. and the late P. G. Johnson was elected President.

Thus it was possible to place Hamilton Standard propellers on Pratt & Whitney engines, install them in Boeing airplanes, fly them on United Airlines and operate them from United airports. This system insured maximum economy of manufacture and operation, thereby giving lowered airline fares and making air travel available to a far wider group. (Airline fares in 1930 were less than they are today!) It also permitted greater control of development of new projects, greater safety of operation, more reliable performance, and eliminated the danger of financial failure of a firm whose engineering and production capacities might have been lost to the nation.

The Air Mail "scandal" of 1934, however, put an end to these industrial capital structures and United Aircraft was forced

to dispose of the Boeing Company and United Airlines, now independently owned and operated. Still in the fold however are Pratt & Whitney, Chance Vought, Hamilton Standard and Sikorsky, all outstanding firms which have made noted and perhaps irreplaceable contributions to the war effort.

Pratt & Whitney, Hamilton Standard and United Aircraft all occupy the same facilities in East Hartford; Sikorsky's helicopter plant is at Bridgeport, Conn.; and Chance Vought is at Stratford, Conn.

Pratt & Whitney has played a vital role in America's growth in the skies and today is one of the two largest suppliers of air cooled radial aircraft engines in the entire world. Millions of horsepower have gone forth from the East Hartford plant and more millions from the Ford (R-2800), Chevrolet (R-1830), Buick (R-1830), Pratt & Whitney of Missouri (R-2800), Jacobs (R-985 and R-1340) and Continental (R-985 and R-1340) licensed plants.

The story of Pratt & Whitney engines could never be fully told, for each engine has lived a life of its own. They have flown throughout the entire world, over deserts and the poles, through jungles and across mountains, done every job from chasing deadly Focke-Wulf fighters across German skies to hauling mining equipment into uninhabited jungles.

But back in East Hartford, engineers and research scientists never rest. More advanced models are constantly being developed, and Pratt & Whitney will shortly begin increased deliveries on a new engine, larger and more powerful than any heretofore developed. This monster will be followed by other advanced designs and Pratt & Whitney will continue to build "dependable engines" for the fighters, bombers and transports of tomorrow, and the day-after-tomorrow, which will carry us into an Air Age such as none of the most daring can predict!

VICTORY

Albatros D.V

(Continued from page 27)

there was no protection for the pilot since his plane had no armor plate nor self-sealing fuel tanks. Indeed, so extensive has been the progress in improving planes that the fighter pilot of today, fearless as he is in combat, would scarcely consider it safe to even fly an Albatros or similar World War I plane around the air field.

Interest among model builders in these old planes has always been great so we take considerable pleasure in offering a trim little flying scale model of the famous Albatros D-5a of 1918. Proportions of the prototype make it ideally suited for reproduction in the form of a flying miniature. If carefully constructed from the plans and instructions presented here, the builder will find he has a model that is not only an excellent flyer but a picture when on display.

Conventional construction methods are employed throughout but be sure to follow the plans closely and read the written instructions. Balsa wood is preferable but white pine may be substituted if the lighter wood is not available. Colorless model airplane cement is used as adhesive to join the parts.

Construction of the two wings is a good start. Ribs are shown full size and the number of each type indicated should be cut from 1/32" sheet; note that three of No. 6, ten No. 7 and two No. 8 are needed. Cut the ribs with accuracy and sand them smooth. The trailing edges and tips

(Turn to page 48)

B-17 "Flying Fortress" Instructor Says "There

← B-17 HEAVY FLYING FORTRESS

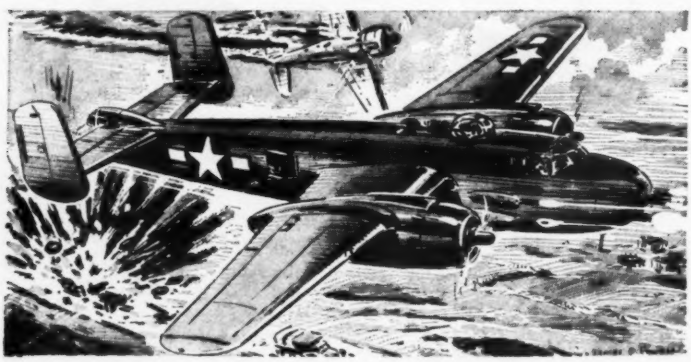
Beyond all question, this is the most famous airplane in the world today. This great four-motored fort of the heavens has, in its years of growth, had many slight alterations—but never enough to make anyone, friend or foe, mistake a fortress anywhere, anytime. Here is the plane that every real scale flying model builder will want to duplicate in authentic miniature to keep as a memento of the "most famous plane of World War II." Span 72¼". C-D MFM* Kit SF-100 (A Jam-packed kit) $12.50

*MFM Means Master Flying Model

B-26 MEDIUM → MARTIN MARAUDER

Most deadly bomber in the world. Really more a pursuit plane than a bomber, as all of those who have ever manned it will attest. It has a high wing loading but it also has the greatest combat safety record of any plane in the world. While other types of bombers may lose from two to six percent in combat, the Marauder loses only .04 of 1%.

It is also world's fastest medium bomber, widely used on all fighting fronts where it has run up high scores in plenty of action. A plane every real model builder will want in authentic scale form. C-D 48¾" span MFM Kit SF-135.............. $8.50



← B-25 MITCHELL

First plane to bomb Tokyo—in that history-making flight, led by Major General Jimmie Doolittle, that took off from "Shangri-la." The Mitchell has been used for *all* types of work—and is known as the most heavily armed plane in the world. Some of today's Mitchells carry a 75 mm. (3") cannon in left lower side of nose, as well as four .50 cal. machine guns, two .50 cal. machine guns in upper turret, two more on each side as blisters below and behind pilot, one in each side of waist turret, two more in tail turret—all in addition to a bomb load which is still on the secret list. This famous plane that has seen action on many fronts is a real "must" model among serious model builders. Span 55" C-D MFM SF-125 .... $8.50

DOUGLAS A-20 or P-70 BOSTON and HAVOC→

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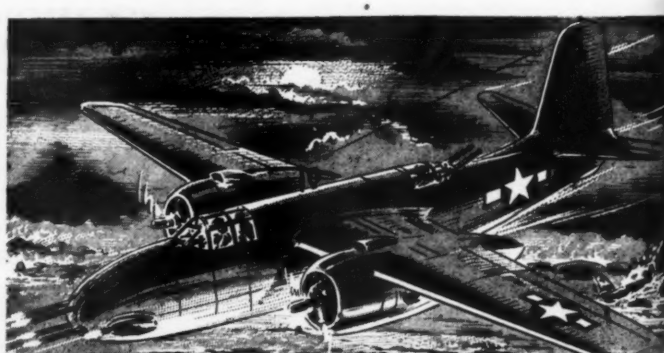

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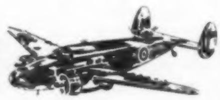

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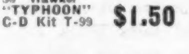

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are cut from sheets of 3/32" thick stock. It is not difficult to reproduce the scalloped effect found on the trailing edges of the real ship's wings. Make a sanding block as shown in the sketch and lightly sand the wood to the required shape. Only the right half of each wing is shown. It is best if a whole wing plan is made so the parts may be assembled right over it. Leading edges are 1/8" sq. strips and the spars are hard grade 1/16" sq. Assemble the parts carefully using pins to hold them in place until the cement hardens. The lower wing is cracked in the center and the tips raised 5/8" for correct dihedral. Tips are raised the same amount on the top wing but the dihedral breaks are at the first No. 2 rib from the centerline; remember to cement the breaks firmly. Be sure to shape the edges and tips carefully so a neat covering job can later be made.

The manner of fuselage construction calls for the use of four keels cut to shape from 1/16" sheet. To obtain their patterns trace the top, bottom and side outlines of the body. Bulkheads, likewise 1/16" sheet, are cut in accordance with the patterns given. Cut only the notches shown leaving the others to be cut as a later operation; however, their position should be marked as reference.

Pin the top and bottom keels to position over the side view and cement half of the bulkheads in place. Attach a side keel and then, when dry, remove the structure from the plan and add the remaining bulkheads and keel. Stringers are 1/16" sq. stock. Attach the ones nearest the side keels first, cutting notches as required. Always attach stringers to corresponding positions on each side at the same time to prevent pulling the body out of line.

Between formers C and D, where the wing fits in, curved pieces are cut from 1/16" balsa sheet and shaped so as to make the fuselage sides fit to the curvature of the wing. Other items to be assembled to the fuselage are the piece of 1/32" sheet between formers D and E which has the center removed and thus forms the cockpit and the small blocks of very hard sheet stock in the rear which anchor the rubber motor.

The nose block, just forward of bulkhead A, is made from two pieces of 1/8" sheet cemented cross-grain. Cut out the center of the nose plug, then roughly carve to shape before cementing to the nose for final finishing by rough and then fine sandpaper.

Few details are required to outline the method of constructing the tail surfaces. Study the plans and note that both the stabilizer and rudder are made in like manner from 1/16" thick stock of the indicated width. Make flat frames of both (the stabilizer is made in one piece), then when the cement has set, remove from the jigs and attach the soft 1/16" sq. strips to each side of each rib. These are trimmed to the streamline shape indicated and the edges are tapered to conform to the rib shape.

Select a very hard balsa or soft white pine block of correct size for the flying propeller. Drill a tiny hole for the shaft, then cut out the blank as shown. A right hand prop is to be carved. Cut away the back face of the blank first until it is as desired, then cut away the front until the blades are of the proper thickness. Reduce the depth of the hub about a third, and neatly round the tips of the blades so an effective unit will be had. With first rough and then fine sandpaper, smooth the propeller to a finish. Shape the spinner from a soft block of balsa and then notch it to fit over the prop hub. Be-

fore the spinner is attached permanently the type of free-wheel gadget, if any, to be used should be considered and provisions made for it. Apply several coats of clear dope with light sanding between each to smooth and harden the surface.

The removable nose plug is shown in perspective. A disc of 1/32" plywood forms the front portion and the back is laminated squares of 1/8" sheet. Fix the line of thrust by cementing washers to the front and back of the plug.

For the propeller shaft use .040 music wire. A loop into which a mechanical winder can be hooked should be bent on the front of the shaft. Place several washers on the shaft, between the propeller and nose plug to reduce friction.

Like most all old-time planes, the Albatros has a landing gear which incorporates a spreader bar type axle. A sturdy reproduction of the undercarriage is made from struts bent from .028 music wire. The front and rear struts are shown full size on the plan, while the axle is simply a straight length of wire 4" long. Bend them from .028 wire and attach the front one to former B by sewing with needle and thread about the wire and right through the wood. Since the rear strut is attached to the trailing edge of the lower wing it can not be placed until the parts are covered and partly assembled.

Lightweight wheels can be purchased or may easily be made from laminated discs of 1/8" sheet balsa. Washers or bearings should be attached to each wheel so they will revolve freely and accurately.

Work over the entire structure with fine sandpaper to properly prepare for a neat covering job. Regular colored tissue or silkspan is used, and thinned dope or banana oil is the adhesive. Use individual pieces of tissue for each flat section of wings, tail surfaces, tips, etc. In covering the fuselage it will be necessary to use numerous small sections of tissue in order to work around the curved parts without wrinkles; the tissue must be lapped neatly to assure a neat job. Lightly cover the parts with a spray of water to tighten the tissue. The flying surfaces must be supported level so they will not warp while drying.

Assemble the various units in this manner: Fit the lower wing into the recess and cement it fast; if the fuselage has been made with accuracy it will automatically have the correct incidence. The upper wing is supported entirely on struts. Make the cabane struts from very hard balsa and shape the crossection as shown. Now to assure the correct incidence for the top surface I suggest that a cardboard jig be made to aid in achieving the utmost accuracy. Trace the outline of the top keel and the wing's exact position on the cardboard, then cut it out so the bottom edge of the pattern will rest on the model's top keel and the top will have a recessed notch into which the wing will set. Using this jib to assure the correct incidence, cement the cabane struts from the stringers to the ribs. Junction of the struts is indicated by an "X" on the wing plan. Outer wing struts are shown in broken lines; they are of approximate length but must be fitted accurately by the "cut and try" method. Incidentally, when attaching the struts be sure to cut away the tissue at the junction to assure a solid fit. Rudder, sub-rudder and stabilizer are cemented fast at the exact positions shown; be careful to align them properly. Any wrinkles in the covering should again be moistened with water and permitted to dry before the entire model is given a coat or two of clear dope.

The landing gear should now be finished. The rear strut is sewed to the front

of the notched trailing edge section. Front and rear struts as well as the axle are best joined by solder but thread wrappings, firmly cemented, will prove satisfactory. To attain the scale width of the struts, 1/16" thick balsa splints may be cemented to the wires. Wheels should be colored before they are attached to the axles by a drop of solder.

Numerous other minor details may be added without impairing the model's flying capabilities. The Mercedes engine can easily be represented by cylinders of balsa made from scraps; exhaust stacks and rocker boxes are likewise made from scraps. The engine unit is colored black. A tiny windshield cut from thin celluloid to the shape shown will enhance the appearance. Scale model fans will note that the shape of the real propeller is given as well as the enlarged flying model one. Control surface outlines are simply thin strips of black tissue doped to the covering. The black German crosses are cut from tissue and attached to the covering.

Finished weight of the model will determine the amount of power required to fly it. Six strands of 1/8" flat brown rubber should be right for the average ship. It is best to lubricate the motor with a mixture of glycerine and tincture of green soap before placing it within the fuselage; incidentally, wipe off the excess lube otherwise it will make unsightly splashes on the sides. Hook the strands to the prop shaft and then drop the other ends through the fuselage. It may be necessary to remove a small section of covering in the rear in order to gather the strands into position to be held by the removable bamboo pin.

First flights are best made over a field of soft grass, but if none is available try rise-off-ground tests with but a few turns. In all probability the model will be slightly out of balance so add a small weight to the nose or tail as the case may be. Off-setting the thrust line will control the amount of circle in either direction and by tilting the nose plug down (small sliver of wood between top of nose plug and nose block) a tendency to stall may be eliminated. As correct balance and stability are attained, power may be gradually increased. For maximum performance stretch the rubber motor out the nose and store up power with the aid of a mechanical winder. Good luck!

VICTORY

Invader!

(Continued from page 15)

ing extremely high lift as well as adequate drag so that shorter takeoffs and shorter landings may be accomplished. The airplane will thus be able to operate from advanced bases all over the world.

The fuselage is of semi-monocoque type construction and is practically square with rounded corners in crossection. Any of various nose types may be installed. Tunnels are built into each side for carrying electric, hydraulic, heat and vent instruments lines and to facilitate service and repair of these lines.

The accessible and quick-change power plant installation is one of the features most favorably commented on by all personnel viewing the airplane. Complete power plant changes may be made in about an hour and there are no left- or right-hand installations; one assembly will fit either side interchangeably. The cowling is in two halves, upper and lower, and may be removed and installed in a few minutes. A spark plug wrench is used to unlock each side, and the bottom

(Turn to page 52)

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drops free—two more fastenings and the top half comes off. Smaller panels in the engine mount and nacelle come off readily and the mechanics can sit in the nacelle and work on the engine accessory section with ease and comfort.

Comment on the engine mount is interesting. Formerly engine mounts were of welded steel tube construction but had certain drawbacks. The welds tended to crack. In mass production there was a shortage of welders. The tubes were always where the mechanic wanted to work, and there was a maze of pipes and wires between the mechanic and the engine after he had taken the cowl off. It seemed advisable, therefore, to try to build a sheet metal type engine mount. This was done by using large metal spinning in the forward part and stainless steel after part, all tied together by six identical forgings running from the engine to the nacelle. The six engine mount attachments tie to the front part of these forgings, and the bolts for quickly removing the whole power plant installation tie the aft end of the forgings and engine mount to the nacelle. Then all the lines, pipes and wires are run out next to this engine mount skin and give the mechanic all the room in the world to work by entering through an access door in the firewall.

The landing gear is hydraulically operated, the main wheels retracting into the nacelle and the nose wheel rotating 90° so as to lie flat in the bottom of the fuselage, thus allowing a fuselage of less depth and less drag.

Three experimental models were produced on this basic design: the XA-26, a light bombardment attack airplane; the XA-26A, a modification to be used as a night fighter; and the XA-26B, mounting a large caliber cannon for destroyer type work. The experimental work on these airplanes provided manufacturers all over the country with information by which airplanes then in production might be revised.

The XA-26 was flown for the first time on July 10, 1942 for an hour by the famous test pilot, Ben O. Howard. After landing the airplane the first time he stated to high officials that if the Army wanted this airplane it was good enough to be turned over to them right then.

Interesting to note is that the XA-26 carried approximately twice the bomb load required by the original specifications and exceeded every performance guarantee. In addition it was under weight 700 lbs.

Success of these three experimental airplanes culminated in the design of the production type A-26B which added additional heavy armor plate for the pilot and combined the functions of two of the experimental models. This design was turned over to the Douglas Long Beach and Tulsa plants for production of the airplane in large quantities.

VICTORY

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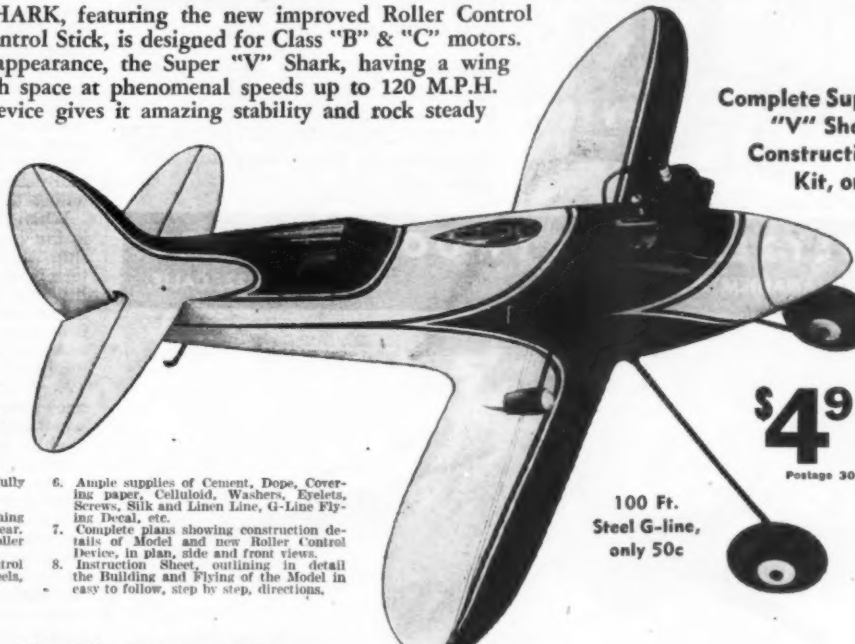

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Airfoils and Streamlining

(Continued from page 25)

higher its ratio of lift to drag. Thus the ideal would at first seem to be the U.S.N.P.S.1, which reaches the exceptionally high ratio of better than 32 to 1. However, thin wings develop less lift than thicker ones. Consequently, to hold a ship of any given weight in the air the thin N.P.S. 1 has to fly much faster than a section like the moderately thick Clark Y, for example. And that's where the rub comes in.

While gliding, an airplane flies at a speed which produces sufficient lift to support it—that is, it glides so that the lift of the wings equals the weight of the entire ship.

The thin section, when delivering the same lift as the thick section, has less drag. But since it is flying much faster, the drag of the *remainder* of the ship is much higher than when flying with the thick wing. Thus the total drag may actually be increased by equipping a ship with a thin wing.

When thinking of using a thin wing, it is the increased drag of the rest of the ship which makes the difference and determines its practicability. It isn't the lift-drag ratio of the wing alone that is important; what really counts is the lift-drag ratio of the entire ship.

A general way to look at the problem might be as follows: Using a thin wing (7% to 8% thickness) on a ship of average streamlining (or lack of it!) isn't worthwhile because the climb may be slightly greater but the glide poorer, thus cutting down the chances of taking advantage of a slight thermal. If the ship's drag is reduced by folding the prop, retracting the gear, cowling the engine, and maintaining a clean, smooth-flowing unbroken surface everywhere, then a thin or medium-thin wing may produce a flatter glide than an ordinary wing on the same ship.

One important factor must be held constantly in mind. It is possible to get a flatter glide using a thin wing and still have a *higher* sinking speed than if a thick wing were used. This is simply due to the extra forward gliding speed which the thin wing must have to get enough lift. If two ships glide along the same downward slant, the faster one will reach the ground first. Now, taking another case, if one glides flat and fast and the second slightly steeper but much slower, the slower one will still take longer to come down. Of course, the flat fast gliding job will probably have gained more altitude on the motor run, so total time if no thermal lift is encountered will be about the same for both ships. However, any thermal lift immediately gives the advantage to the slower-sinking job.

So to take complete advantage of the possibilities of thin or medium-thin wings, the ship must be streamlined enough so that not only will the gliding angle with the thin wing be flatter, but it will be enough flatter to overcome its disadvantage of gliding forward faster than the thick wing. Thus, if the thin wing produces a much flatter glide the ship will sink downward even slower than with the thick wing, so long as there isn't too much difference in the forward speeds.

VICTORY

The tests mentioned in this article were made under the auspices of the Comet Model Airplane & Supply Co. where the author is Chief Designer.

Stability for Model Airplanes

(Continued from page 36)

the flat glide without the usual initial dive to regain flying speed. Timed and compared with other models the performance was superior. The test pilot of any high power (or low power) airplane will tell you that the speed for best climb is around two times the stalling speed. If your ship will glide at say 12 mph, it will then climb best at approximately 24 mph *forward speed.*

Most ships just stall and twist upward in a climb. They climb into a stall, swing around to a new position (if they are stable) and do it all over again. If the thrust is greater than the weight the ship continues up without stalling only because the polyhedral or dihedral is so great that it makes the ship swing around before it can loop. But if the engine fails immediately after takeoff a recovery dive must occur, and if the altitude isn't great enough it's a crack-up. Not so with a high thrust line job; its speed is sufficient to immediately effect a flat glide. It takes a lot of courage to put the thrust line so high—but that is where it belongs.

The stabilizer setting has some effect on the thrust line location but not a great deal. First, the speed of the slipstream is easily double the climbing speed of the ship; therefore if the stabilizer is set to lift it will lift more while the engine is running than when stopped. This lift will of course help to counteract the nosing up tendency of the thrust. By the same token a stabilizer that is negative or pushes down will push down more during the engine run, thus making the nosing up or stalling condition worse. Incidentally, that high "T" section tail I previously used is OK for the glide but not for the climb. The high stabilizer makes it necessary to raise the thrust line even higher. So keep the stabilizer as low as possible if your model stalls badly.

The next problem is the premature stalling of the wing tips. If the tips stall first a spin is sure to start; the tip just drops and spin is under way. Why does the tip stall first? Here's the answer:

1. Highly tapered wings always stall at the tips first.
2. If the wings are warped so that the tips have the most incidence they will stall first. Check up and take the warp out; in fact, as later shown, put it in, in reverse.
3. If the tip has a different airfoil from the center section—one of less camber or thinner or both—it will stall first.
4. Sweepback hastens the stall at the tip.

Any wing, regardless of taper can be made stable with tip slots. Col. Clark's plastic ship and Lockheed's various craft utilize wing tip slots for lateral stability. Tip slots are probably the most powerful means of achieving lateral stability. Slots will practically double the effective maximum angle of stability. But don't put slots over all the span. The stability is not as good. A simple wing without slots of any kind will have spinning tendencies at about 16 degrees. A wing with full slots will, at about 25°, while wing tip slots will give stability up to about 32°. Incidentally, these slots increase the lift of the wing slightly. Col. Clark measured it on his ship. *It is suggested that the slots extend over at least 10% of the span and not more than half the span.* Last summer the writer conducted exhaustive tests on slots for models and came to these conclusions. Slots are definitely worthwhile.

(Turn to page 58)


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Incidentally, I also used slots on the stabilizer; it kicks the tail up faster when the engine stops. Most ships climb so steeply that the tail is stalling during the climb, hence the need for slots.

Slots improperly designed and installed can be worse than none at all. They might actually work in reverse. The opening at the underside must be wider than the opening at the top, preferably twice or more as wide. This will cause the air progressing through the slot to be speeded up and will then produce a fast moving sheet of air over the upper surface, which is what is needed. If the opening at the top is as wide or wider than at the underside the speeding up action is lost and nothing beneficial happens. See Fig. 1 for details of slot design. Two ways of making slots are shown in Figs. 2 and 3. The slot arrangement is not as good as the built up arrangement although quite effective. Slots may easily be added to an existing model as shown in Fig. 3. The same rules apply for slots on the stabilizer.

Satisfactory lateral stability may also be obtained in another manner. Use "washout." This means placing the ribs at the tips at less incidence than at the center section. Ordinary elliptical or normally tapered wings should have at least 2° of washout; 3-1/2° to 5° is better. Highly tapered wings require more washout. A five to one tapered wing was built and washout was added till the lateral stability was satisfactory. It took 8-1/2°. Fig. 4 shows how "washout" may be built in to a new wing. Or, if you prefer to use an old wing, just steam it and twist the trailing edge at the tip upward. Don't be afraid to put in enough washout. If you are building a new wing use "set-up" blocks as shown in Fig. 4. An easy way to do it is to make each of the last four ribs with 1° more than the previous rib.

Man-carrying sailplanes were among the first to use "washout." They employ anywhere from 1° to 8° depending on the design. American power ships also use it. The highly tapered low wing of the Ryan S C has considerable "washout" in it. Various military craft use it, too. You certainly need not hesitate to use it; just have both tips equal in "washout."

A true experience story about "washout" is not amiss at this time. Kenny Ernst of Indianapolis is an old hand at models—he has designed numerous excellent ships and won many prizes and trophies. In the summer of 1938 he designed the *Comarant*, soon to be nicknamed the "Come-apart" for its frequent crack-ups. This ship was beautiful, highly original and of efficient design. Its monowheel landing gear and engine were carefully streamlined into an egg shaped nacelle that supported the high wing of 8 ft. span and the enlarged boom for the tail. Everyone remarked about its graceful lines and flat glide.

That ship should have taken the prizes —but it didn't. Kenny would sweat and toil all Saturday night to be ready to fly in a contest on Sunday. With all his launching skill he would start the ship into the air; up it would go and if it got through the first turn it usually continued upward. But it was always a constant worry until the timer stopped the engine. Kenny did just about everything humanly possible to that ship, even to developing a final twist in his hand launching method. But 9 times out of 10 she would "splatter." Hence the nickname "Come-apart." By Christmas he gave it up as a bad job.

(Turn to page 60)

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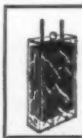

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CORR'S

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I was having similar troubles with my ships so I could not offer any worthwhile advice. Then in January, an old friend from Detroit visited me—Dallas Wise, considered the best Franklin Glider pilot in this country. Kenny came over and he and I told Dallas our troubles. Dallas in his usual conservative, quiet manner then told us of the success of "washout" in sailplanes, how much was used and all about it. Why wouldn't it work for models? We decided to try it. I built a new wing for my ship and Kenny steamed a twist into the tips of the *Comarant*. He also fixed *Ole Betsy*, another of his ships, in the same manner.

The following Sunday was very windy; however, we couldn't wait so we started the engines and the ships went up like elevators. On a 15 second engine run the ships would land at the extreme opposite end of the field, at the edge of the woods. The *Comarant, Ole Betsy*, and my ship, an experimental *Professor*, were performing perfectly. We flew all day long—always holding our breath just before the landings near the trees.

Kenny and I were sure that "washout" was the answer. Just before dark (Kenny always stays till the last minute) the *Comarant* was flown for its last time. It flew into the trees—one of the most realistic crack-ups I have ever seen. Just one good day of flying for the *Comarant* —but its efficient design and eventual stability were proven. (Kenny, why not build a scaled down model of the *Comarant?* It should be a champion.)

Another effective way to achieve stability is with a combination of airfoils. Use a slow stalling airfoil at the tip and a faster stalling section at the root. I have built a number of these wings and find them entirely satisfactory. I used the 4512 (NACA) at the root and the 6412 airfoil at the tip. The taper was about 2 to 1. This method of achieving lateral stability was quite an improvement over conventional single airfoil wings.

The NACA also recently reported that sweepback will contribute to the early stall at the tips. Several new airplanes soon to be announced have straight leading edges—all the taper is at the trailing edge. This same procedure is advised for models.

Summing up: The properly designed tip slot is the most effective. "Washout" is next in effectiveness—use from 3½° to 8½° depending on the extent of taper. Use of a slower stalling tip airfoil is effective, but not quite as good as tip slots or "washout." Thick sections and high camber with maximum camber and thickness well back from the leading edge are best. Also, avoid sweepback, keep the leading edge straight as possible.

Incidentally, high dihedral angles or polyhedral is not needed with wings that do not stall at the tips first. Wings were built with but 1/2" to the foot dihedral and they flew swell. However, the usual 1" to the foot dihedral is recommended for good all-around flying in any weather.

Twisted slipstream on the rudder causes a ship to turn into the ground unless the rudders are accurately set to counteract the twisted airflow. We can't cause the slipstream to flow in a straight line; however we can remove the rudder from the slipstream by using rudders. Twin rudders offer four advantages: (1) Very little slipstream twisting effect results from twin rudders. (2) Rudders are less sensitive to adjustments because the fast moving slipstream does not reach them. Your glide adjustment is usually okay for the power flights. (3) Less rud-

(Turn to page 62)

der area is required. Total rudder area for twin rudders need only be 75% of that for a single vertical surface because they are out away from the fuselage and are less affected by "blanketing interference." (4) If you use a monowheel landing gear the twin rudders will keep the ship level when on the ground.

Another advantage of twin rudders is herewith offered. When a ship has spiral instability and comes spinning into the ground it usually raises its tail, gains speed and starts turning. Now if the tail did not raise as it turned the effect would not be so drastic. It is therefore suggested that the twin rudders be set so the tops of the rudders are closer to the fuselage than the bottoms. This is shown in Fig. 5. Then, as the ship starts to swing around, the force of the air on the outside rudder will tend to push the tail down, thus slowing it up. Any air hitting the inside rudder will also tend to raise that rudder or bring the low inside wing up to level.

Thus far, no mention has been made of stability in pitch (that due to the elevators). Most builders don't seem to have much trouble with longitudinal stability so little need be said. However, remember this much: if your ship is slow to respond, check up on the tail length. Lengthening the tail will add to the stability and is advised rather than increasing the size of the tail surfaces.

Another thing to remember about stability: don't spread out your various weights such as engine, coil, timer, batteries, etc. Keep them all close together so that they can not build up high moments around the center of gravity. Keep all heavy items as near the C. G. as possible. However, if you must spread out your batteries, etc., then use a longer tail length to compensate for it.

VICTORY

Off the Line

(*Continued from page 2*)

approximately 18" wide at its greatest lateral dimension when a minimum of 30" is required for a pilot's shoulders and elbows, more if possible. On this drawing there are approximately 24" from the bottom of the fuselage to the top of the cockpit enclosure when a minimum of 50" is required from the average pilot. Here is the wing, about 8" at its thickest part, and the designer states that resting snugly inside is an Allison "W" engine of some 5000 horsepower! Here are eight 20 millimeter cannon projecting from a conical nose tapering up to the 18" width and 24" height of the fuselage at the cockpit. The distance from nose to windshield is approximately 36". In this space the designer has mounted eight 20 mm. cannon!

Our advice to this young designer, offered with sincerity and understanding, is that he first of all assemble some figures: dimensions of the engines, armament, crew, equipment, etc., and jot them down on a piece of paper. Make a rough sketch of the engine to scale and draw a wing around it! Draw a rough sketch of a pilot 6' tall, weighing 180 lbs. in a seated position and draw a fuselage and enclosure around him. Sketch out, roughly, a machine gun or cannon and draw the nose around them. After you have done this . . . what? You say your design has gone all haywire? It bulges in all the wrong places? The wing is now four times as big as the fuselage? The whole thing is a mess? You say it doesn't even look as good as a *Lightning* or a *Thunderbolt*, much less better? Perhaps, after all, you are not a Hall Hibbard or an Alexander

(*Turn to page 64*)

Kartveli! Perhaps these men are Chief Engineers for a reason then, not just old-fashioned pencil-pushers.

When a Hibbard, a Kartveli, a Page, a Berlin or a Northrop starts a new design he says: "What must go *inside* this airplane?" With a specification before him he mentally collects all these items in a heap in front of him. In a preliminary way he sketches all these items in an approximate location on a large sheet of paper, each item carefully to scale. Then he sketches in all the unspecified items: controls, electrical and hydraulic systems, instrument panels and lines, seats and fixtures, fittings and brackets, and starts sketching in some rough structure. If everything looks satisfactory up to this point, then (and only then), does he idly run his pencil around these items enclosing them within a fuselage and wings.

Does this look like a "super-hot job . . . much better than a *Lighting* or a *Thunderbolt*"? Probably not. And so the design begins the systemization of these items; with accompanying rearrangement of the exterior lines of the airplane. Working day and night a year goes by and the plane is ready for production. Super-hot? Well . . . maybe. But it will have safe landing and takeoff characteristics, fuel economy, crew comfort, safe stalling and spinning characteristics, ease of maintenance, simplicity of production, standardized small parts and, above all else, be able to do adequately the specific useful job for which it was designed.

And so with other "inventions"; work out the exact details first, then perfect the final form. A lack of knowledge can never be condemned but the world holds little for the creator of a beautiful bubble containing exactly nothing.

—*The Editor*

Snobber

(Continued from page 17)

Install the dowels for the tail. Glue up enough 1/4" sheet to make the rudder. The rudder should be sanded to a streamlined shape and the tab cut in. Use two small pieces of tin for a hinge and cement in place. The cut-out for the stabilizer is not made until it has been constructed.

WING—Probably the most important part of a successful contest model is a good wing. Constructed properly, a well designated wing will show excellent results in the way of fine flights. The wing shown is really efficient. A lot of fellows just don't like flat bottom airfoils, even though they are easier to build. The section used is Rhode St. Genese 35, an airfoil developed in a laboratory similar to our own National Advisory Committee for Aeronautics. Contrary to results of most undercambered airfoils the effectiveness of this airfoil increases as the Reynolds Number decreases. For this reason it is particularly adapted to models. A complete chart of ordinates are shown in order that you may faithfully duplicate this section in any other size.

Make a good template and cut out 27 full ribs and 26 false ribs all the same size. You will note the tip spars taper as does the chord of the wing. In order to keep the wing tapering smoothly, make the complete tip outline and cut the ribs to fit. Prop up the tip and cement in place. You will find most of your fairing will be on the bottom. This is a fairly simple matter as the bottom is flat. The top will need very little fairing but should be cut to the airfoil shape. Note the dihedral braces; be sure you have a good joint when installing the dihedral. The tip dihedral should be put in first, then the

center. The celluloid on the bottom of the wing is a lot stronger than the usual balsa; it is 1/32" thick and is cemented in place with ordinary cement. The small piece on the top will keep the trailing edge from being cut by the rubber band that holds the wing in place. Do not be afraid to use sandpaper for a well sanded job is an expert job.

The wing is covered with a light grade of bamboo paper. The tips were covered wet. Three coats of dope and then trimmed with orange will complete the wing.

STABILIZER—As with the wing tip, the stabilizer outline is a swept forward 2/3 ellipse. Just draw it by making the chord of the rear half twice that of the front half. The stabilizer is quite strong, considerable strength being in the rather ample outline. The section is the old reliable Clark Y. Make 15 ribs cutting out for all the spars. Make the entire outline and insert the ribs, taking care that the spars are kept straight. The top spar cutouts have to be made deeper so they will fair in at the tips. The top surface is then faired in using a sharp knife and a sandpaper block. Shape the outline and insert the sheet balsa on top and the stabilizer is ready for covering.

It was covered with crossgrained Silkspan and hasn't warped a bit in its old age. At this time the cut-out is made in the fuse and the stabilizer fitted. It is set at 0° incidence.

DOPING—The entire model was given there coats of dope, sanding the surface between each coat. The original color scheme was light blue fuse with orange trim. Deep orange was also used to trim the wing and tail. A name plate with your name and address should be attached to the wing mount with cement.

TESTING—Providing the model is built as directed very little adjusting will be required. The usual procedure of increasing and decreasing the incidence to provide a smooth glide is used. The motor should be in with a little right thrust to counteract torque. The model should climb to the right in a *flat* turn and glide to the left.

There are various means of obtaining a flat turn and the best way seems to be a slight amount of warp in the right tip.

There have been reams of literature on testing and it is very important. Make sure you know your model, then go out and win those contests!

VICTORY

Air Ways

(Continued from page 31)

his repeating the performance. All this time and effort you are expending won't really be work because nothing is really work unless you would rather be doing something else and a real modeler doesn't want to do anything else.

After that super-duper ship is built you send in a picture to *Air Ways* and what happens . . . we don't print it. So you sulk a bit and gripe a little (maybe you even let us know it), and you are sure your genius isn't recognized, perhaps never will be. The important thing is: don't give up! You build a better ship and then . . . "well fellows, what do you think of my latest model—didn't you see it in M.A.N.'s *Air Ways* last month?" A goal has been established, recognition achieved. The cup of success is sweet even to its dregs.

Perhaps the first ship you sent in was just as good as the one we printed, but look at our side of the ledger. Maybe we

had dozens of photographs of other models of that same plane so naturally we had to select the one with the finest photographic details. That is why it is not only important that your model be good but also that it is photographed in a manner suitable for publication.

So, come on boys, are you going to be the chap that talks about the perfect model he is going to build or are you going to be the one who actually does build that ship? Actions speak louder than words and that is exactly what we want . . . action, plenty of action—perpetual motion if possible!

* *

Clifford K. McBaine, 6971 Eastman St., San Diego, Calif., sends in Picture No. 1 with the comment: "Enclosed photo is that of my Ryan ST-M which required 3 months to build. Every detail is correct according to the designer of this airplane. I am employed in the Engineering Department of this company and therefore was in a position to confirm the details which include all movable dual controls from both cockpits with instrument panels and movable flaps, upholstered headrest and cockpit rims, wire struts on wing and empennage. Other details are exhaust stacks with duplicated oil leakage and exhaust burn on side of ship, pitot static head, gas gage to gas tank cap. Rivets were duplicated on the sheet balsa covered fuselage by typing a period on narrow strips of paper and attaching with dope. Also ribs were exaggerated by doping thread over the ribs on the paper covering. The model is a 3/4" detail scale of 22-1/2" wing span." Not only is your ship an excellent model, Clif, but the photography is absolutely super.

Picture No. 2 is the work of J. C. Yates, Jr., 4010-1/2 Monroe, Los Angeles 27, Calif. He says: "I have been bedfast for a couple of years and started building models about a year and a half ago. Since then I have learned some of the tricks of the trade. The *Hellcat* photo was taken by an amateur photographer, Bob Hughs, who I think is fast approaching the skill of a professional. It was built from flying model plans (3/4") and covered with heavy cardboard to resemble metal covering. It looks like a solid but has the feel of a flying model. It took me quite a while to learn to put this heavy covering on but it's worth the trouble and patience. It has a molded cockpit and motor detail." From the appearance of the finished product, it was more than worth all the effort you put into it, J. C.

Picture No. 3 is the work of Richard Campbell, 123 Cochran Street, Fairmont, W. Va., who writes: "School has temporarily halted production on a 7 ft. *Condor* glider but I'll get it done eventually. The enclosed photo is a Gee-Bee made from a kit with a few modifications. The whole plane is planked and has a dummy motor in the nose. It is red and white doped. The model has a cockpit complete with controls and instrument panel; also a seat and headrest. It took several months' work to complete." It certainly is a fine model, Dick, and worth every minute you put into it.

Picture No. 4 comes from Bill Steeneck, 50-46 43rd St., Woodside, N. Y., who says: "I have been reading your magazine faithfully for more years than I can re-remember and have never written. Your editorial in this issue about 'unfinished jobs' just couldn't go unanswered. I can truthfully say I have never committed that crime although I have been a model fan for almost 20 years and I am far from an expert. However, like so many other modelers I build and fly for my own

(Turn to page 68)

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pleasure and have never seemed able to build a kit model without adding a few of my own ideas." A careful study of Picture No. 4 will certainly prove how clever some of Bill's ideas can be.

Picture No. 5 comes from Bob Hildebrand of 610 Laurel Avenue, Wilmette, Ill. Bob writes: "Enclosed is a snapshot which indicates the design and construction of a Class A gas model I designed a couple of years ago. It won the only contest in which it was entered. The climb is a fast spiral, and the model named *Snuffy*, is really capable of some fast flights under power. In the glide the story is a bit different. The retractable landing gear and folding prop coupled with good streamlining and a modified X-8 section makes for a very slow flat glide. Up high it looks like a Class C job, the way it soars." What we want to know is why you only entered this swell model in one contest?

Picture No. 6 is one of the most original jobs it has been our pleasure to include in *Air Ways*. It is an "out of this world" control line speed job by J. Westell, [?] Huxley St. S., Hamilton, Ont., Canada. We would like to tell you more about this speed merchant but Mr. Westell failed to enclose a description of his model. How about letting us in on the details?

Picture No. 7 comes from Ensign John G. Flynn, athletic officer at the Norfolk Navy Yard, Portsmouth, Va., and shows his kit model of a Curtiss *Hawk* P-6-E. John says: "I've been away from modeling for about three years but the bug has been after me continuously and finally succeeded in forcing me to succumb. All control surfaces are movable from cockpit controls. The cockpit is complete in every detail with throttle and safety belt. Am anxious to see how this job stacks up with others you have seen. The greatest satisfaction I got out of constructing this model was in solving the problem of installing a system of controls that would work and still be hidden sufficiently." Photo credit for this picture goes to Abbott Lutz Ph. M. 2/c USNR. Well, we know that if John and Abbott continue to collaborate further in the future, the one turning out such keen models and the other such swell photographs, there will always be a spot in MODEL AIRPLANE NEWS for their fine work. Keep it up, boys!

Bill Noonan of 4546 58th St., San Diego 5, Calif., sends in Picture No. 8 which is his latest model TBM-3 solid. Bill says: "It has a 22" span and is made entirely of balsa. It differs from its predecessors in that the cowling has two scoops, one at the top and one at the bottom; also the cooling flaps are altered. I drew up the plans for the *Avenger* from photos and from seeing the real ship. The model turned out to be more difficult to construct than anticipated. The turret was difficult to shape and get to look like the right proportion to the rest of the ship and the stabilizer mount has a peculiar fillet in it which was rather hard to duplicate." We don't doubt that it was hard to duplicate, Bill, but you certainly have done it.

Dan Heald of Phillips Exeter Academy, Exeter, N.H., sends in Picture No. [?] writing: "Last year when I arrived here at school I noticed that there was a large indoor track building with about a forty foot ceiling, so I got busy experimenting with indoor models of all sizes and types. I started with superfine covering on a simple stock job. The best time was [?] sec. (75 sq. in. wing) which seemed good to me. However, I learned that a stick body will bend under full power, changing

(Turn to page 70)

BOYS
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(AGE, 5 TO 65)

Well, here they are—Cadet's NEWEST 1/72 scale airplane models—THE INVASION SERIES—accurate in every detail, made by the manufacturer of the most successful scale model airplane of the year; the famous Boeing B-29—Cadet's new INVASION series of American and British top-flight fighters.

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ing the adjustment, so I changed it for a built-up fuselage with landing gear. During the course of the year I did a good deal of experimenting, learning a great deal about this type of model. So this year for my first R.O.G. contest I built a really super job covered with micro. I worked a long time over the plans trying to get the best possible force set-up as well as keep the weight to a minimum and the construction simple. The result was the model of which I have enclosed a photo. This is to my mind the perfect indoor job. The fuselage is covered with superfine tissue to facilitate handling. I found it next to impossible to fly the little ship without touching the micro on the body at some time sooner or later thus breaking the film and necessitating entirely recovering it. The wing and tail are microfilmed, the prop is of sheet. Construction does not call for any intricate bracing of tungsten or paper strips, or balsa of too delicate sizes. Yet this little ship has many attractive lines including an easily built elliptical wing and tail. Despite its extreme simplicity this little (60 sq. in wing) job flies beautifully. She takes off in about 6" of run, climbs steeply until it hits the forty foot ceiling after about a minute and a half (it bounced off five times in one flight) and keeps circling about for another minute. When I first started building indoor jobs I looked all over for simple, yet efficient looking plans. There were none. This model is just perfect for the average builders who want something simple that will really perform in their local Y.M.C.A. or high school gym. A larger model would be too big for their gyms, a smaller one wouldn't fly well enough. One entirely of microfilm would be too delicate; one covered with tissue would not fly well enough. This then is the answer for the average high school builder." You have something there, Dan, and it's probably the answer to a modeler's prayer.

Joe S. Ortner from Buenos Aires sends in a group of mighty interesting photos concerning model activity down in the Argentine. No. 10 shows Hugo Pessina, one of the oldest (time not age) builders in the Argentine, although he is a Paraguayan by birth. The glider he is holding is his own design; it has a wing span of 2-1/2 metres. Unfortunately he lost it at a meeting recently; after 8 minutes flight it entered a cloud and vanished.

Robert Hinkle, 2nd Lt. A.C., De Ridder, La., sends in Picture No. 11 and writes: "The model P-47 was built from a kit and redesigned for the bubble. Most of the details were obtained from the real plane which helped construction considerably. As the photos show it is complete in every detail possible for a model of its size—14" span. The cockpit is complete to safety belt that operates, and shoulder harness, bucket seat, push button radio, radio beam detrola and oxygen fittings. The bubble canopy, made from celluloid and stretched over a form in boiling water, slides open. A word on the finish might help the less experienced builder: after several coats of dope are put on and sanded, try mixing talcum powder in some dope to thicken it. After it has been doped on and dry sanded with fine sandpaper you will be amazed at the way the pores fill up. Also a putty made the same way does wonders for fillets. My next scale model will be the P-51D bubble canopy job and I hope it turns out as well as this one. I guess I have a soft place in my heart for the 51 because it is the plane I fly. Incidentally, you can thank the 13th T.R. photo group for the picture, I never could do as well." Per-

(Turn to page 73)

haps the 13th T.R. group couldn't make as fine a model as you, Bob, so suppose you share the credit, giving yourself the largest portion.

CLUB NEWS

California

There was quite a bit of excitement at the last gas model contest held by the *Fresno Gas Model Airplane Club*. The day was perfect with the sun shining brightly and hardly any breeze. There were only two thermals . . . Jim Watson got one and Wm. Dunham the other. Paul Nieto tried a new hand launched glider of his own design and lost it on one of those thermals. Russell James captured a trophy in the Junior Division by winning three times in a row. Ted Dice did some nice flying with his cabin type plane to take first in Class C, nosing out Red James and thereby getting his name on the monthly trophy. Two more wins and it is his to keep; but Red James also only needs one more win to keep it. With two more contests to go, anything can happen. (Are you making any bets, boys?) Official results were:

Class A—Ocie Randall.
Class B—(1) Wm. Dunham; (2) Jim Watson; (3) J. R. James.
Class C—(1) Ted Dice; (2) J. R. James; (3) Ocie Randall.

We reprint with pleasure excerpts from modelers overseas, as compiled by Ocie Randall and published in his "Snooping Around" column of the F.G.M.A.C. News. Ed (Tex) Marbut is now stationed at Big Springs, Texas, still training for the Air Corps . . . A V-Mail from Lester Briner, formerly of Modesto and now in England, states that the idea of a West Coast Nationals is a good one and he would like to attend the first one with his big sailplane . . . A long letter from Pfc. Kenny Fisher saying: "Give my regards to the boys. I miss the gang more than I thought I would. Here in the Fighting 16th we are using the big C-46's which we prefer to call the 'Plumber's Nightmare' " . . . A very long letter from Jack Soldani, who is in Saipan, saying: "You know, a guy really doesn't realize what a good thing the Club is until he is away from it a while. I miss you guys more than you'll ever know. The Club is everything a fellow could hope for, fun, enjoyment, sportsmanship, skill and flying. It gets into your blood, and with me, when I am building and flying I am happy and also a fanatic, but I love it! Tell all the gang 'Hello' and I am waiting for the day when I can come home and prune the ears off you champs." He also says he has a lot of Jap souvenirs . . . Frank Creene of Long Beach says: "Things are stirring at National A.M.A. headquarters and if anyone has an axe to grind sic him on me." He then goes on to explain why he has forsaken free flight models with all the dethermalizers and such for a more advanced type of flying, mainly and decisively U-Control. He claims there is no further improvement in free flight whereas there is an untold future in U-Control . . . Francis Steward, of Bakersfield, writes that they are still holding their monthly contests on the second Sunday of every month and he would like to see some of the gang sometime . . . A letter from June Dyer of Oakland answers an inquiry as to the relationship of June and Jack—they are mother and son; furthermore she is the world's most ardent lover of model aviation and what it stands for.

A proposal was made to hold an annual banquet and presentation of trophies and awards in Hotel Fresno. The tentative program is something like this: Each person will pay 50c per plate and the

Fresno Exchange Club will underwrite the balance of the cost for the dinner. There will be speakers; and it is proposed to have a notable figure from the Air Force come over and make the presentation; also some good moving pictures will be shown. The evening surely has the makings of a very nice one for all those who attend. It will probably be held the first part of January so as not to conflict with the election of officers in December. How about it, gang, what do you think of the idea?

Minnesota

Results of the 14th Annual St. Paul A.M.A. Model Air Meet held at the Twin City Model Airport were as follows:

Class A—(1) Russell Booth; (2) Chuck Blumer; (3) Paul Weidenbach.
Class B—(1) Russell Booth; (2) Chuck Blumer; (3) Ray Medlin.
Class C—(1) Russell Booth; (2) Alfred Tschida.
Cabin—(1) Roaul Brickner.
Stick—(1) Al Tschida.
Glider—(1) Roger Sorensen; (2) Roaul Brickner; (3) Roaul Brickner.
U-Control—(1) Ralph Peterson; (2) Wally Erickson; (3) Odd Sjem.

New York

The *Schnectady Aeroneers* have just sent in the results of their Fourth Annual Meet held at Tourtellot's Farm:

Class A—(1) H. Hine; (2) A. Pearson.
Class B—(1) A. Pearson; (2) W. Truesdale; (3) Gunn.
Class C—(1) A. Pearson; (2) R. Baxter; (3) G. Humphrey.
H. L. Glider—(1) Conklin; (2) Kapuscienski.
H. L. Fuselage—(1) Baxter; (2) Reed.
H. L. Stick—(1) Flood; (2) Schneider.
T. L. Glider—(1) Christofell; (2) Baxter; (3) Acton.
J. H. Schneider Trophy Night Contest—(1) H. Hine; (2) A. Pearson; (3) L. DiMezzia.
A. H. Reed Trophy Sailplane Contest—(1) J. Schneider; (2) A. Pearson; (3) H. Hine.

Ohio

The *Ohio State Air Cadet* contest held at Sheppard Field, Akron, Ohio, was quite a success. It was by far one of the largest ever held in this vicinity and registered 456 entries. Lt. Jackie Coogan (of movie fame, now a glider pilot) and Capt. Wyjno of Akron, also an Air Force veteran, gave speeches and helped out at the Meet. Winners of 1st and 2nd places are:

Class A (Gas)—(1) Jr. Nick Rickardi; Sr. J. E. Rufi; (2) Jr. Thomas Sivilo; Sr. R. Mitchell.
Highest Time Jr. and Sr.—J. E. Rufi.
Class B (Gas)—(1) Jr. Ralph Croaning; Sr. James Malone; (2) Jr. Don Packer; Sr. Richard Jordan.
Highest Time Jr. and Sr.—James Malone.
Class C (Gas)—(1) Jr. Bob Wilson; Sr. Geo. Reich; (2) Jr. Art Weitzel; Sr. Jack Norris.
Highest Time Jr. and Sr.—Geo. Reich.
Hand Launched Glider—(1) Jr. Russell Stahlman; Sr. Dick Obarski; (2) Jr. Lynbon Jacobs; Sr. Don Orman.
Highest Time Jr. and Sr.—Dick Obarski.
Cabin—(1) Jr. Barre Bodenlos; Sr. Don Orman; (2) Jr. Geo. Mergenov; Sr. Emily Orman.
Highest Time Jr. and Sr.—Don Orman.
Flying Scale—(1) Jr. Barre Bodenlos; Sr. Chester Lanzo; (2) Jr. Bill Katzenmeyer; Sr. Dick Fox.
Highest Time Jr. and Sr.—Chester Lanzo.
Towline Sailplane—(1) Jr. G. Earlenbaugh; Sr. Alvin Schaefer; (2) Jr. Russell Stahlman; Sr. R. H. Bodle.
Highest Time Jr. and Sr.—Alvin Schaefer.

Kansas

The Contest Committee of *Hy-Flyers Club* in Wichita, Kansas, are planning to hold at least one U-Control contest a month in the future. However, this depends on the amount of interest shown in indoor contests this winter. Some of the microfilm fans have also made it apparent that they will not be left out, so contests for indoor rubber powered free flight models will also be held, probably on the same days. They will fly first on the program before the arena is filled with wing tip varieties. These monthly contests will culminate in a Wichita Indoor Championship Meet. The *Hy-Flyers* are now in the

midst of their fourth session in aerodynamics—interpreted for the model builders by President Jim McClelland with the able assistance of Norman Crook.

Virginia

The *Model Airplane Club* of Annandale, Virginia, held a series of club meets on three successive Sundays at Bailey's Crossroads Airfield. These meets were for members only, but other model plane enthusiasts in Washington and vicinity not members of any active club were invited to join on payment of $1.00 annual dues.

This series of model airplane meets gave local model builders one of the few opportunities for organized competition in the vicinity this season, and it offered more than the usual amount of spectator interest because the models were required to taxi across a runway and rise off the ground like real planes rather than just be tossed into the air by hand in the usual fashion. Bebe Barron, 12, of Springfield, Virginia, won the silver loving cup given by the Club for making the three longest flights with a gasoline powered plane. Bebe's plane, a 56" winged *Playboy Junior* driven by a Forster "29" motor, flew for 99 seconds in spite of gusts of wind and a timing device set to cut the switch after motored flight of ten seconds. The time nosed out Bryton Barron of the State Department Office of Public Information, Bebe's father. He took third place in the three-part competition. Roger Barron, 9, took second place. Fourth place was awarded Lyall Steger, while Steger's son Lyall, Jr., 16, tied for fifth place with Tom Handley, 14, of Arlington.

Peru

We received an interesting letter concerning the *Club de Aeromodelismo Jorge Chavez* which was founded in Lima, Peru, in 1940 by a group of enthusiastic model builders. Their president, Sr. Mario Breciani, has built models for many years and has widely traveled in England, France and the United States. During his trips he became aware of the important job accomplished by model airplane clubs in furthering a knowledge of aviation among the youth of various countries, and upon his return he founded the first model airplane club in Peru, and flight activities with rubber and gas models were commenced.

Six contests have been held between members of the club, an inter-city contest between Lima and Huancayo, and two big free contests in which more than a hundred boys and girls participated. Adrian Gamarra holds the South American record in free flight for Class C rubber within a 24' mark. Some members of the Club are trying radio control jobs, others are testing their U and G Control models, but the rubber enthusiasts have been curtailed due to the rubber shortage. All model supplies are imported from the United States. Balsa wood grows freely in the mountains of Peru so it is plentiful and cheap. At the present time, however, the club members are relaxing until new gas motors, rubber and other supplies so important to model builders can be obtained from the U. S.

The Club has many plans for the future; they intend to teach model building in all schools in the country and to organize National Contests comparable to those in the U. S. Arrangements are being made with the Inter-American Escadrille and the Office of the Coordinator of Inter-American Affairs to further model building in South America.

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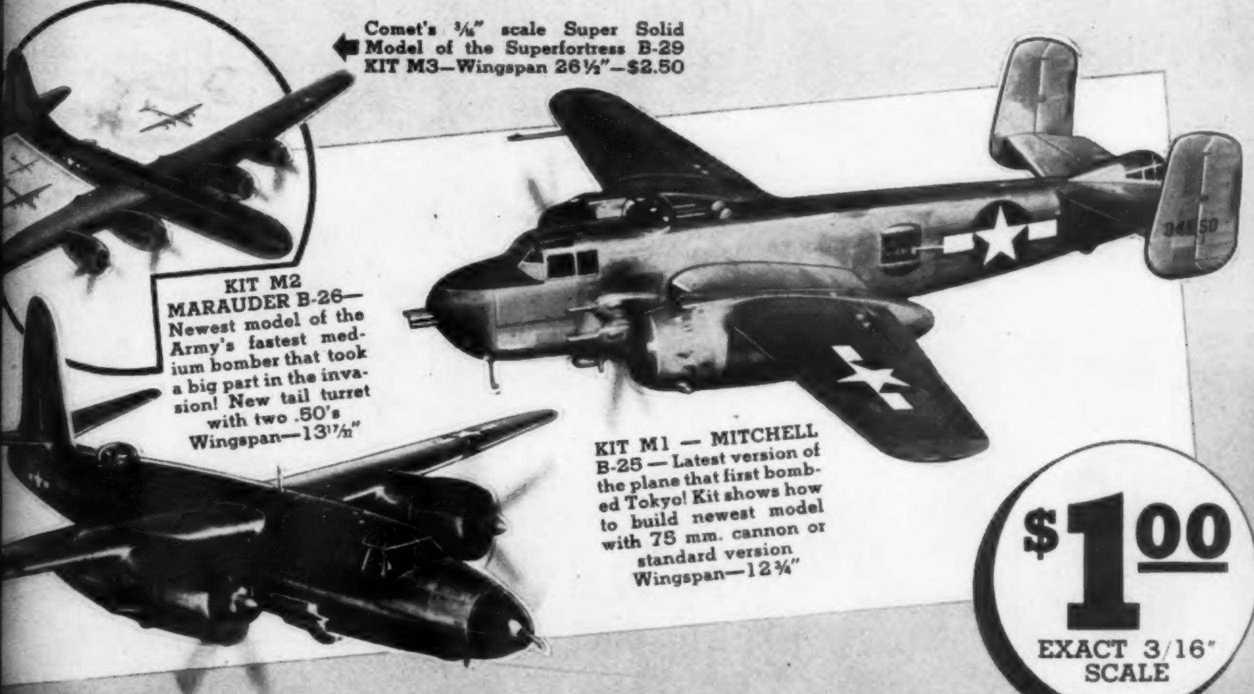

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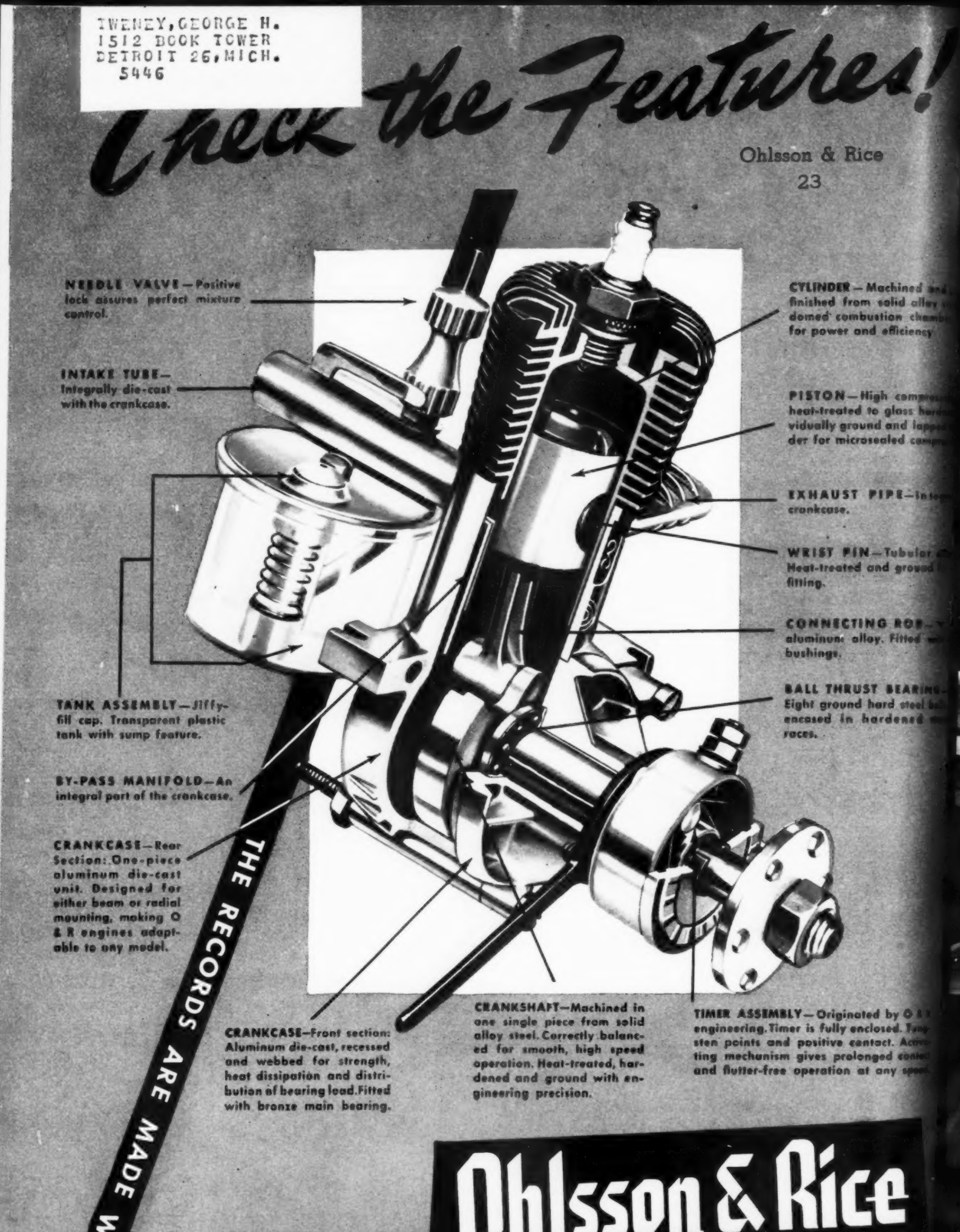
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